THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXII. No. 1835.] LONDON, JULY 12, 1898. [50TH YEAR. PRICE 6d.

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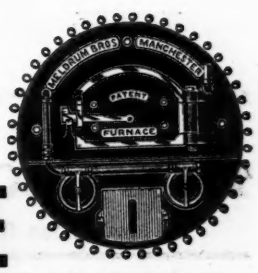

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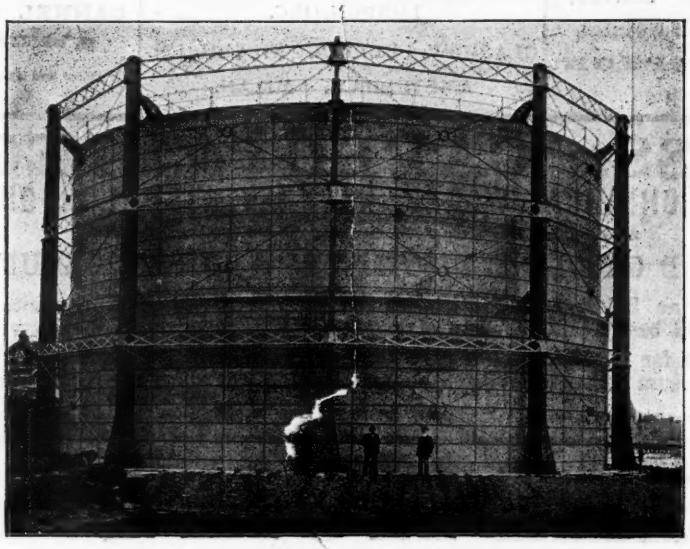

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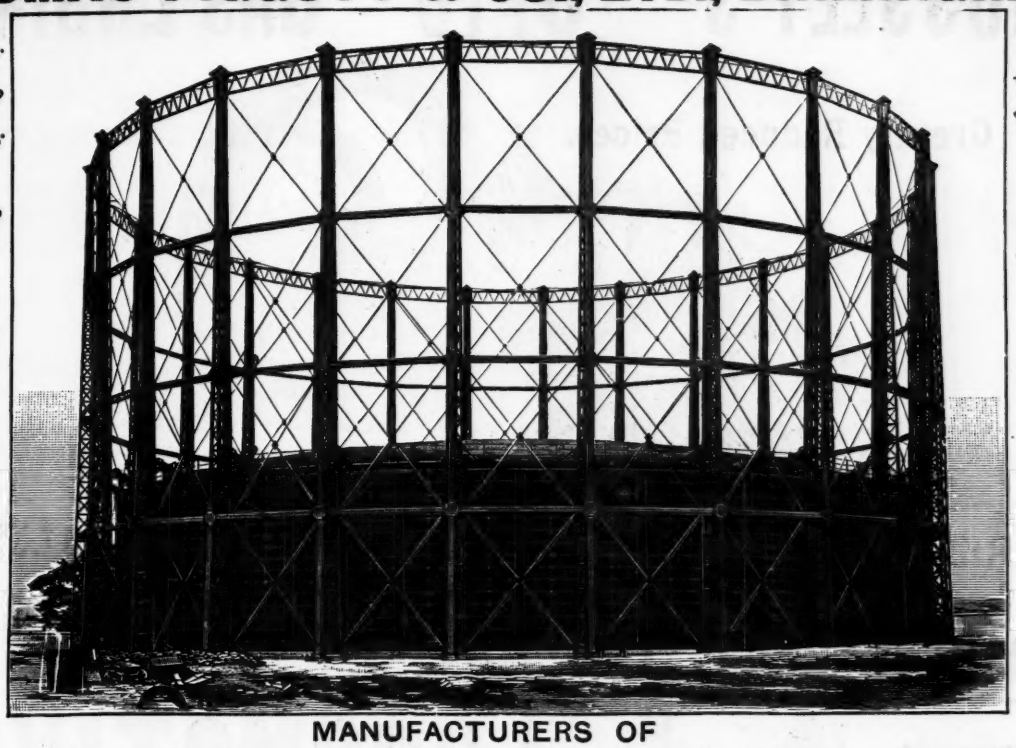

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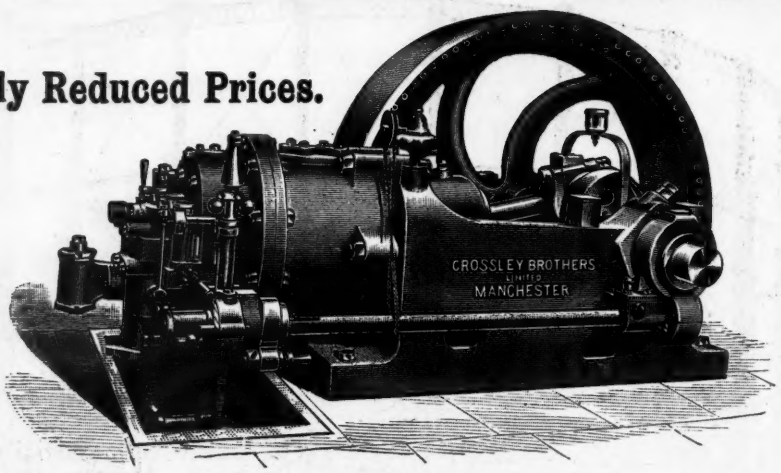

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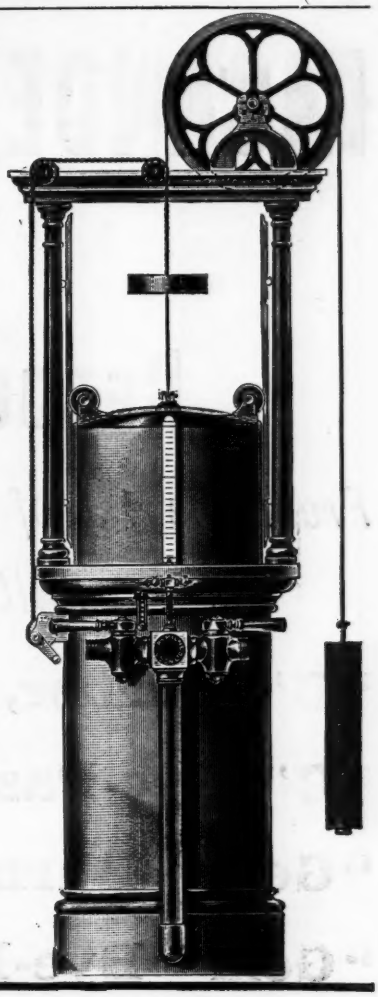

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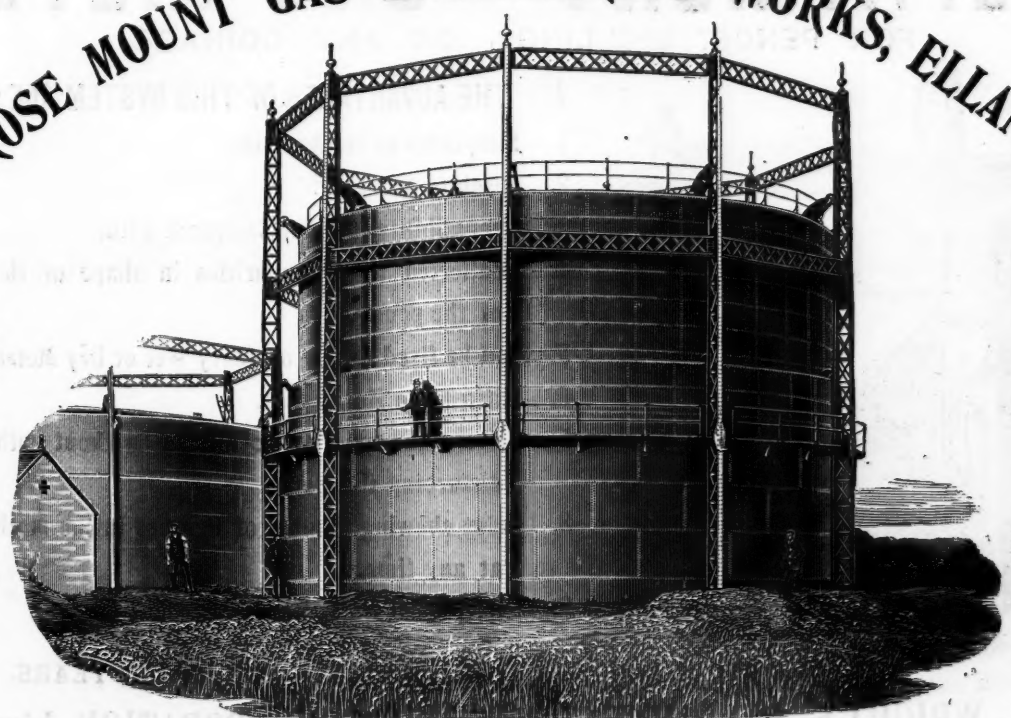

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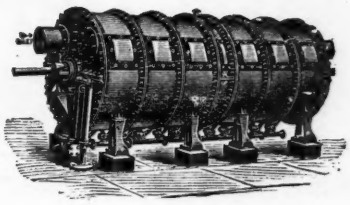

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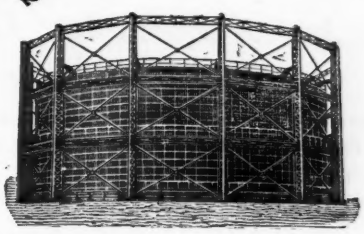

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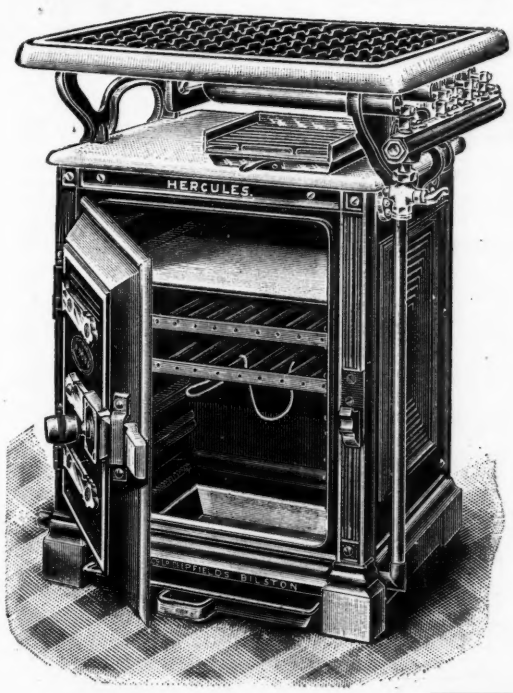

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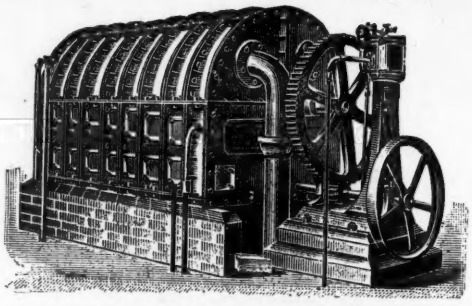

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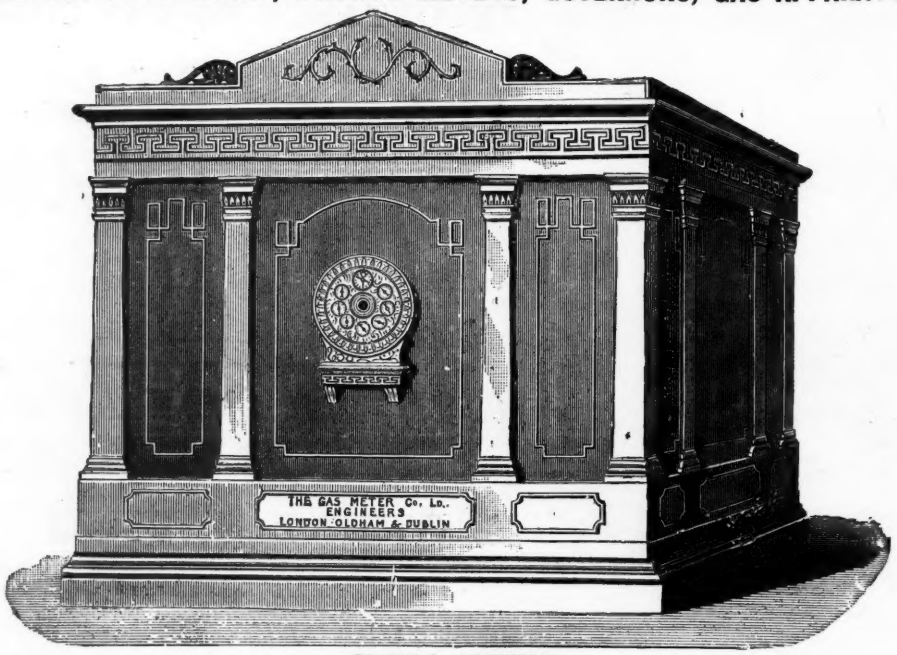

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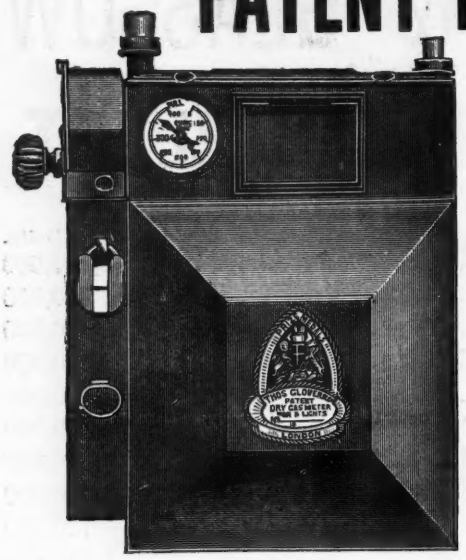

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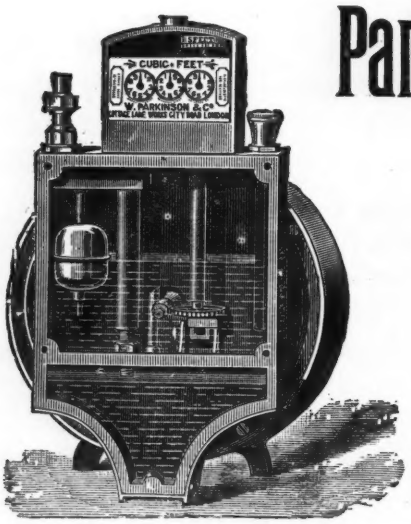

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EDITORIAL NOTES.

Workmen's Compensation—The Stoke-on-Trent Scheme.

THE subject of the Workmen's Compensation Act has become a standing dish for the technical and general Press. Not a day passes without bringing out something fresh concerning the new order introduced into the industrial life of the nation. An interesting conference was held at the Westminster Palace Hotel on the 28th ult., under the presidency of the Lord Mayor of Manchester, which was attended by representatives of a number of Municipalities owning gas-works, for the purpose of discussing the action to be taken by Corporation Gas Committees in regard to the Act. The meeting was convened by the Mayor of Stoke-upon-Trent (Mr. F. Geen), who proposed that Local Authorities thus circumstanced should join in a scheme of mutual insurance against the liabilities created by the Act. A resolution to this effect was carried unanimously; and an Executive Committee was formed to give effect to the resolution. The Committee is to consist of a representative from each of the Local Authorities for Stockport, Rochdale, and Macclesfield, with Mr. J. W. Wilson, M.P., Oldbury, who are to confer with the Mayor and Town Clerk of Stoke-upon-Trent. Mr. Geen is to be congratulated upon the initial success of the movement started by him; and general interest will be felt throughout the country in the development of his scheme, the ripened particulars of which will, we hope, be shortly forthcoming. It is not quite clear, from the authorized report of the proceedings of the meeting which appears elsewhere, whether such an arrangement is meant to include all Corporation workmen to whom the Act applies. We read the resolution, as altered by the meeting, to apply only to the case of employees in gas and electricity works. Here again it would appear that gas is to help electricity; for there is no doubt as to which is the more dangerous service. Mr. Geen appears to have at least the outline of a scheme already sketched out; so that it was something more than a bare suggestion of principle to which his meeting gave provisional adhesion. He is reported to have said that he considers a premium of 5s. per cent. "ample," and to have suggested that out of such a payment, "after providing a "sufficient reserve fund, bonuses should be paid to those "authorities whose workmen had not received as much "out as had been paid in on their account."

It is with no desire to pour cold water upon Mr. Geen's well-meant endeavours that we venture to observe that his Insurance Committee will need to be very careful what risks they admit, if they are going to form a strong reserve fund and return appreciable bonuses out of a premium income calculated upon a 5s. rate for all gas-works and electricity supply labour. There are gas-works and gas-works; and the same remark applies with even greater force to the generation and distribution of electricity. It was very nice of the Lord Mayor of Manchester to take the chair at Mr. Geen's meeting, and approve generally of his proposal; but there can be very little in common between the gas undertakings of Stoke-upon-Trent and Manchester. The grouping of gas-works for mutual insurance, under the guidance of somebody with a head screwed on the right way, appears to be the first condition of success for a scheme of the kind contemplated. Gas-works on the largest scale, with power machinery, and steam locomotives running at all levels all over the works, must be more liable to accidents in working than quiet country stations with no working machinery besides the exhauster and a pump or two—if indeed the latter come under the Act at all. Few Corporation Gas Committees possess insurance funds. Capital would have to be provided somehow. Precautions must be taken to cause contributories to adhere to the scheme; and also to make the scheme answerable for continuing liabilities. Moreover, who knows how many more beneficiaries would be fastened upon a mutual fund than the individual works would pay directly out of their own revenue? However originated and supported, a mutual insurance scheme, from the moment of starting in business, would have to be worked exactly like any other insurance office, if it is to succeed.

The argument for mutual association for this purpose does not apply to gas manufacture as it does (say) to collieries, or even to engineering works. A big colliery explosion might ruin the owner of one pit; but there would not be explosions in every pit of a number of associated coalowners. Then among engineers, a gang of

hoisters employed by one firm might meet with some bad accident which the firm might not be able to deal with single-handed. This is a plea for association. The case of gas-works is quite different. The risks of the employment are almost wholly those of individual workers, and are among the lightest of all organized industrial avocations. So far as we can see, mutual association for insurance against workmen's compensation, for gas undertakings, would only increase the cost of the operation, while tending to weaken the sense of responsibility of the contributories, and introducing an element of uncertainty into the protection.

The Year's Work of the Sulphate of Ammonia Committee.

THE first annual general meeting of the subscribers to the Sulphate of Ammonia Committee was held last Wednesday —Mr. W. G. Blagden in the chair. The report presented by the Executive Committee respecting their year's work showed that the task of making sulphate of ammonia better known among British agriculturists is not an easy one. Indeed, it is complained that the English farmer is hardly to be reached at all by means open to the Committee. It is probable that the newspapers and other enterprises which live by this shy recluse manage to get hold of him somehow. The Agricultural Societies seem to have disappointed the Committee by their indifference to the bait of prizes for manuring competitions. There may be more reason for this than appears upon the surface; and it may be worth inquiring whether counsel could not be taken in this regard with the ruling authorities of the principal Societies. The Committee are getting ready for their great prize essay competition, the terms of which are shortly to be advertised. It is to be sincerely hoped that the result will answer their expectations. The company that assembled at Mr. Blagden's offices were not inclined to criticize the first year's operations of the Committee too severely; a placid feeling of contentment, born of better prices, evidently pervading the meeting.

The Accounts of the Manchester Gas Department.

THE annual accounts of the Manchester Corporation Gas Department have been presented to, and received by, the City Council almost without comment. The output of gas shows a decrease of 0·69 per cent., as compared with an increase of 11·16 per cent. in the previous year; the cause being the high temperature prevailing during the winter months. The number of consumers has, on the other hand, increased during the year by 11,616; and it is reported that the use of prepayment meters has largely extended—proving a great boon to the tenants of cottages. There is still plenty of room for the growth of this branch of gas consumption in Manchester and the out-townships; there being at present only 3·05 per cent. of prepayment consumers within the city. The application of gas to purposes other than lighting continues to increase. The total amount of revenue of the department for the year was £553,642, as compared with £552,816 for the year 1896-7, or an increase of £826. The net profit on the year's working was £56,167, of which amount £50,700 was paid over to the City Fund, and the balance placed to the suspense account in regard to the expenditure on carburetted water-gas plant. It is reported that the whole of the works and plant have been kept in a state of thorough repair out of revenue. Under the advice of Mr. G. E. Stevenson, the manufacturing and distributing plant of the different stations is being modernized. The department, as in duty bound, support the Ship Canal by getting their carburetting oil shipped direct to a storage depôt at Mode Wheel. It will be remembered that at this time last year the Gas Committee unanimously recommended the Council to reduce the price of gas in the out-townships by 3d. per 1000 cubic feet and abolish the meter-rents; but the recommendation did not prevail. Consequently the City Fund gets the extra £10,000 or so of profit which the proposed act of generosity—or of justice—would have anticipated. In moving the adoption of the report, the Lord Mayor drew attention to the selling price of gas within the city, of which he seemed to be proud. There is nothing particularly creditable to Manchester in selling gas at 2s. 3d. per 1000 cubic feet, without meter-rents. The price has remained at this figure for the past three years, while many smaller towns have been able to encourage local trade by offering reductions in the charge for gas. The Manchester Corporation have not yet learned the lesson of using their Gas Department for this purpose.

Questions of Wages in the Coal Trade.

THERE has been a good deal of talk during the week about prices and wages in the coal trade. The Welsh strike and the Compensation Act have been influencing the whole trade, and creating subjects for discussion in the London and Provincial newspapers. First of all, Sir Edward Fry, the Conciliator appointed by the President of the Board of Trade to deal, according to statute, with the former trouble, has notified his appointment to the Secretary of the Coalowners' Association. He states in this communication that, in pursuance of this duty, he proposes in the first instance to seek an interview with representatives of the workmen; and he will then probably ask the Committee of the Association to meet him. It all depends, of course, upon how the Conciliator fares with the strikers. Meanwhile, the Secretary of the Coalowners' Association has issued a statement setting forth the facts of the dispute, and explaining the action taken by the associated employers. This is done in order that the public may know how the present state of things was brought about, and who is responsible for its continuance. It is admitted by the workmen's representatives that the first step was their own notice to terminate the sliding-scale agreement. This was done in October last; but it was not until February of the present year—a month before the date of the expiration of the notice—that the same men began to discuss the matter with the employers' representatives. Then it came out that the men wanted the masters to commit themselves to a design for controlling the output of coal with the object of keeping up prices and wages simultaneously, and also to accept the proposal for the addition of an outside umpire to the new Sliding-Scale Committee. Neither of these projects could the employers accept. On the 1st of March, the workmen's representatives made new proposals again embodying the "control of the output" scheme; and it became known in the course of the subsequent discussions that they, the representatives, were not equipped with power to settle matters with the other side, who for their part were so prepared. The employers pointed out the inequality of the proposed arrangement, and also stated that, in view of the imminence of the date of expiry of the scale agreement, it would be necessary for them to give a month's notice to terminate contracts of employment. For taking this course the employers have been vilified from platforms and by the Press; the men averring that it constituted the dispute a lock-out by the masters.

The men's leaders have declared that the notices to terminate employment were the source of all the bitterness that has characterized this severe struggle; some of them stating that they personally implored the employers to keep the men in work while the negotiations were going on. If this had been so important a consideration, one would think that the men might have begun negotiating earlier. The employers' statement puts it, however, that the true cause of the trouble was the refusal of the men to trust their leaders with plenary powers. It is asserted that this difficulty still persists. The conclusion of the statement is as follows: "The employers are convinced "that the majority of the men, if their opinions could be "taken fairly, are in favour of a return to work. But the "employers have no desire to take advantage of their "necessity, and are still willing and desirous to discuss "terms of settlement with properly authorized represen-"tatives. They cannot, however, close their eyes to the "fact that the men's present leaders are distrusted, "and that they distrust one another. Moreover, it is "clear, from the conduct and the utterance of these leaders, "that they do not, in fact, possess the full authority "which the President of the Board of Trade has insisted "upon as a condition precedent to action by a conciliator." The statement proceeds: "At present the employers have "waited for no less than three weeks without hearing "from the workmen, although the latter are aware that "the employers are at all times willing, and even anxious, "to discuss terms of settlement." The men's leaders, it is reported, are amusing the strikers by attending meetings at which nothing is done but abusing the employers and passing resolutions asking for outside assistance for the men and their families. So long as the strikers continue of this mind, it is difficult to see what the Conciliator can do with them.

A conference between the representative Committee of the Coalowners within the area of the Miners' Federation,

and the Miners' Federation Committee, was held at the Westminster Palace Hotel last Wednesday afternoon, under the presidency of Mr. A. M. Chambers. After some considerable discussion of the men's demands for an advance of 10 per cent., a mutual arrangement was agreed upon by which the men will receive a rise of 2½ per cent. from October next until January, when a Conciliation Board on the lines of the Rosebery settlement will decide the rate of wages within defined limits. The conclusion is regarded as satisfactory, inasmuch as the men get their rate of wages assured for a considerable period in advance, while the employers are relieved from anxiety on this score while they are working out the results of recent legislation.

The Report of the Committee on Old-Age Pensions.

THE report of the Committee appointed to inquire into the question of old-age pensions was published last week. Lord Rothschild was the Chairman, and the report is signed by all the members. The terms of reference to the Committee were generally as to whether anything could be done to encourage the industrial population, by State aid or otherwise, to make provision for old age in some other way than is done by existing arrangements having the workhouse in the background. The Committee found themselves confronted with more than a hundred schemes, which for the most part they were able to classify into four groups. The first comprised schemes involving compulsory contribution towards a pension fund, either by the German plan of deduction by employers from the wages, assisted by a contribution from employees, or by way of an annual or a lump payment made by all young persons before a certain age, and accumulated at compound interest until the pension age. In the second group fell schemes providing a universal grant of pensions to everybody on attaining a certain age. The third group was of schemes providing special facilities and encouragement to voluntary insurance for old age, with material assistance from the State. Lastly, there were schemes applying only to members of friendly societies.

It is for some reasons a pity that the Committee considered that their terms of reference precluded them from recommending any scheme based on compulsion, as contrasted with encouragement. This had the effect of ruling out the German plan, and most others except those included in the third group. One would have liked to have a detailed criticism of the German system by the Committee. Broadly speaking, they find that nothing can be done with the question submitted to them. After examining all the schemes which seemed worthy of any attention, they were forced to the conclusion that there was not one of them, whatever its particular merits, which would not ultimately injure rather than serve the best interests of the industrial population. They did not, however, restrict themselves to purely destructive criticism, but proceeded to hammer out a scheme upon lines originally suggested by one of the members as fulfilling the conditions of the reference. Even this project proved unsatisfying. It was only very slowly, and with great reluctance, that the Committee accepted the conclusion that the thing proposed to them is impossible. The most hopeful observation expressed in the report is the consideration "that a large and "constantly increasing number of the industrial population "of this country do already, by prudence, self-reliance, "and self-denial, make their old age independent and "respected." The Committee further "entertain a strong "hope that the improvement which is constantly taking "place in the financial and moral conditions of labour "will do much to deprive the problem we have had "to consider of the importance now attaching to it." In other words, mankind must continue to trust in the immemorial methods of Individualism; there being no help in even so modified a Socialism as that which inspires the reference to the Committee.

It is due to the Committee that their report, through which the sense of a heavy responsibility runs so manifestly as to give its sentences an air of great solemnity, should be carefully read by all those who are interested in the subject. The most disappointing feature of it is that it leaves the practical problem exactly where it was. Rightly or wrongly, the community have come to desire that something better than the cold comfort of the workhouse should be provided for the aged poor who have worked all their lives, and yet missed making provision for themselves at the last. As "The Times" remarks, "it is deplorable, and even dangerous, that a large por-"tion of the working population of the country should be "left dependent, when past its prime, on public or private "charity, or on the help of relatives who, in the greater "number of cases, can hardly pay their own way." We all know the meaning of the latter sentence, and can see around us illustrations of the way in which helping to maintain aged relatives hampers the efforts of the still active workers to provide for themselves. It is all very well to preach "thrift" to working people; but, unhappily, the practice of thrift comes easiest to those who are already selfishly disposed. Large employers of labour are now making provision for their servants who are past work upon the only sound principle—that of superannuation upon a regular scale, irrespective of the recipient's private means, and from a fund to which he has contributed. How the State could be substituted for the employer in such a system, and the right to superannuation be given in respect of citizenship alone, is the problem which the Committee have confessed their inability to solve. It may be doubted if it is possible of solution upon any basis which the nation could accept; but if our Socialists are good for anything in the way of constructive criticism, they will now take the Committee's report in hand, and show the world just what they could do with its unsolved problems.

WATER AND SANITARY AFFAIRS.

THE Suburban and Outer Authorities sent a strong array of witnesses before the Royal Commission last week. There was a consensus of opinion that the London County Council was to be dreaded and avoided. Richmond was said by the Chairman of its Water Supply Committee to have "an indescribable fear of the Council." On behalf of the consumers in the district of the Kent Company, objection was taken to the London County Council having "any power over them;" it being considered that the interests concerned were antagonistic to each other. Beckenham, which was supplied mainly by the Kent Company and partly by the Lambeth, had no favour for the idea that the London County Council should purchase the Companies' property and sell water in bulk. Croydon, as represented by its Corporation, wished to supersede that portion of the local supply which was furnished by the Lambeth Company, and was decidedly opposed to any scheme by which the borough should take a supply in bulk from the London County Council. In short, the Croydon Corporation wished to extend the area of their supply, so as to have the borough to themselves. At the same time, "if matters were left absolutely as at "present," Croydon would not press for any change. Throughout the evidence given by the several witnesses, there was an entire absence of anything like serious complaint against the Companies; and if any dissatisfaction was expressed, it was merged in a general apprehension that any interference on the part of the London County Council would be hurtful rather than beneficial. To have the command of their own supply was the prevailing wish of the Local Authorities; and the Chairman of the Council appertaining to the Croydon rural district stated that the ratepayers were opposed to being associated with the London County Council, lest they should be involved in a plan for bringing a water supply "from a long distance." This contingency evidently has an influence on the outlying Authorities, as observed by Lord Llandaff a fortnight ago. The attitude of Middlesex and Surrey is repeated in Kent; and there is a desire to avoid being drawn into the maelstrom of a gigantic Welsh project. On the other hand, there is a narrow feeling that the local resources are to be kept in reserve for purely local purposes. The enormous resources of the chalk area are thus to be locked up for the benefit of particular districts—a policy which Nature herself forbids; the underground waters being continually seeking an outlet in the direction of the sea. One of the Commissioners, Major-General Scott, has suggested another view of the case—namely, that the local supply may fail, and that the policy of isolation may lead to a difficulty. The Croydon rural district, in connection with Surrey, is thus referred to. We cannot but feel that the appropriation of water areas is a subject for scientific

inquiry, and one which should be dealt with on a broader basis than that afforded by sectional local demands.

If the world is governed with little wisdom, the Local Authorities exhibit little knowledge with respect to the enactments which relate to the water supply. There is a cry for "more control" over the Water Companies. But control already given is not exercised. It is very likely that the want of action arises in a great measure from the circumstance that the law itself is not wanted. But there is the curious fact that the Local Authorities are often in ignorance that the law exists, and are asking for that which has been already given. This singular defect was apparent in the case of some of the witnesses who came before the Commission last week, and provoked the remark from the Chairman that the Local Authorities never seemed to read or trouble about Acts of Parliament relating to water. Lord Llandaff was so impressed by this extraordinary ignorance as to say that "it made one rather shy about "recommending any further enactments." The Beckenham witness complained that the Lambeth Company gave only an intermittent supply; but, when questioned on the subject, he candidly acknowledged that no steps had been taken to obtain a constant service, as provided for by the Act. Lord Llandaff seemed to feel that the case was past remedy, when a Local Authority ignored the statutory powers which had been placed at its disposal for years. Some of the witnesses dwelt on the importance of enabling the Sanitary Authorities to take samples of water for the purpose of analysis; and it was apparently thought that nothing was simpler than filling a bottle with water, and having the liquid analyzed.

Insurance against Employers' Liability.—A correspondent writes on this subject as follows: I send a form of policy for insurance against employers' liability, which has been introduced by the underwriters of "Lloyds;" the rates being about one-third or one-fourth of those charged by the Tariff Companies, and which appears to be meeting with great approval, especially by employers whose records for accidents have hitherto been good. Of course, with such low rates of something like 2s. 6d. per cent., the risk taken must necessarily be different from that of the Tariff Companies. The difference is this: The Companies take all the risk; but Lloyds only take the uncertain part of it. The employer has no claim under his policy until he has paid compensation up to a certain definite amount. Suppose, for instance, he pays £10,000 a year in wages, on which the Lloyds insurance premium of 2s. 6d. per cent. amounts to £12 10s., he will have no claim until he has paid £37 10s. in compensation; but beyond this limit the policy covers all risks—workmen's compensation, employers' liability, and common law. The advantage consists in the removal of the uncertainty. If the accidents in any year are normal, the employer bears the burden, which cannot exceed a fixed amount; but should there be a catastrophe of any kind—either a serious accident, involving death or injury to a number of men, or an abnormal succession of accidents—in any year, then all the extra risk is to be taken by the insurers. Such a case as the accident at Tynemouth a few years ago, when several lives were lost, and which may happen anywhere, shows the advantage of this system, which seems to be especially applicable to small employers and small companies.

The "Pluto" Patent for Utilizing the Waste Heat of Gas-Lamps.—The latest development of the novel lamp introduced by the "Pluto" Hot-Water Syndicate is now to be seen in Leicester Square. It was opened to the public on Thursday last; and the simple function drew together a crowd of people whose appearances were as diversified as the criticisms which they passed on the substantial and useful structure around which they were assembled. The primary object of the invention is the utilization of the waste heat of street-lamps in the heating of water, which is retailed to the public on the "penny-in-the-slot" system. The means by which this is accomplished were described in the "JOURNAL" for Sept. 21 last; and the only improvement in the gas lighting and heating portion of the arrangement is in the adoption of a Denayrouze burner, on which are mounted five incandescent mantles. It was thought by some that there would be a loss of efficiency in the water-heating power by the change from flat-flame burners to incandescent ones; but the contrary has been proved. During the daytime the lights are turned down so that the mantles are merely glimmering; and this is found sufficient to maintain the supply of hot water. At night the light given by the lamp is most brilliant; and it affords much satisfaction in the neighbourhood. The greatest development has been made in the base of the lamp; for the one in Leicester Square not only supplies hot water, but purveys light refreshments in the shape of beef tea, coffee, cocoa, sweets, &c. The novelty of the thing attracts good custom; but it is to be feared that, after the novelty has worn off, the competition of the street lamp with the existing cheap refreshment establishments will be short-lived.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 112.)

LAST week was rather disappointing on the Stock Exchange. It opened very strong, and afforded good promise of a general improvement. But people remained rather shy and cautious, and business did not increase. The consequence was that things relapsed into a dull condition; and inactivity and heaviness prevailed right up to the close. Prices in almost all departments have given way, from Consols downwards—the American market from its special circumstances being the only conspicuous exception. Money for short loans was more abundant than ever, and could be had on the very lowest terms; but discount rates hardened, owing to Continental demands. A fall in the Bank rate on Thursday was regarded by many as probable; but the Directors made no change. The Gas Market was much more active than it has ruled of late; and the general tendency was good. The chief feature was the brisk demand for the debenture and preference stocks of The Gaslight and Coke Company at well advanced prices. Good safe securities which afford a better return for money than the choicest gilt-edged stocks are being inquired for. Gaslight "A" was in fair demand, though not so lively as the other issues; and it slowly and gradually rose from 293 on Monday to 297 on Saturday. South Metropolitan was quieter, but showed no sign of yielding its strong position. There was more doing in Commercials. The old stock was depressed by a parcel being thrown on the market; but the new stock improved a couple of points. Little enough was done in the Suburban and Provincial group. Movements were irregular—Alliance advancing, while British receded. Business in the Continental undertakings was much below the average; but the characteristic was strength. Imperial had a fair advance; and Union preference rallied after its fall. Among the rest, for some occult reason or other, Bombay was put up, and Oriental was put down. San Paulo had a further rise. In Water, as in Gas, the chief business seemed to be in the debenture stocks, and for the same reason. Business was only moderate; but all issues were strong and buoyant.

The daily operations were: Business in Gas was quiet on Monday, being confined to Gaslight issues; and the "A" advanced 1. In Water, Lambeth tens rose 2. Tuesday was very brisk; and Gaslight secured issues again almost monopolized attention—"A" rising 1 more. Imperial gained 1; and San Paulo, ½. Lambeth Water rose 1 more. Business was much quieter on Wednesday; but quotations moved freely. Gaslight "J," Commercial new, Union preference, and Imperial advanced 2; and Bombay, ¼. But Commercial old fell 2½; and Orientals, ¾. In Water, West Middlesex rose 2; and Southwark "D," 3½. Thursday was brisk; and activity in Gaslight secured was resumed. "G" rose 12½; "F," 3½; "C," "D," and "E," 3; "J," 2; and "K," 1½. British was ½ lower. Friday was quieter; but Gaslight secured were still on the move—"J" advancing 1 more. In Water, Kent rose 2. Saturday wound up with another gain of 1 in Gaslight "A;" and Alliance rose ½.

ELECTRIC LIGHTING MEMORANDA.

Mr. J. L. Sayer on the Electric Lighting of the City of London—A Defence of Commercial Enterprise—The Generation of Electricity in Bulk—Competition in Electricity Supply.

THE subject of the electric lighting of the City of London, mentioned in this column last week, has been dealt with in a letter addressed to the "Daily News" by Mr. J. L. Sayer, who was Chairman of the Streets Committee of the late Commission of Sewers at the time of the formation of the Pioneer Company. We recorded the fact that the personalities indulged in with respect to this transaction by the journal called "London" have drawn upon that publication an action for libel. Now the ex-Chairman of the Streets Committee, disregarding for the time being the personal side of the matter, has explained the circumstances very much upon the lines of our last week's comment. Mr. Sayer declares that the article in "London" contains "serious misstatements of facts, and is otherwise calculated to create false impressions both of the past and present conditions of electric lighting in the City." This article put a bad complexion on the whole arrangements to which Mr. Sayer was a party in his official capacity. Naturally, he objects to this treatment; and he asserts that the Commissioners of Sewers acted honourably and for the best throughout the business in respect of which they and others have been "so ignorantly attacked in 'London.'" Moreover, he claims that the Commission made an uncommonly good bargain for the electric lighting of the City. The City actually pays about 2¾d. per unit for the electricity supplied for public lighting, including everything; and, as Mr. Sayer justly remarks, not only was this a remarkably low charge at the time the contract was made, but it is probably as cheap as the City could do the work for

themselves at the present day. He confirms our statement that the public lighting of the City is not worth having as a business by itself, by showing that the Company have expended £128,000 of their capital upon it, for which there has been little or no return.

Our perfervid Progressive contemporary is not to be envied the situation it has so wantonly created for itself. Advocacy of the principle of electricity supply by local authorities, like every other "cause," needs to be conducted with circumspection. Unhappily, respect for the motives and conduct of those who differ from the party is not one of the points of the Progressive "program." In regard to the particular matter of the provision of electric lighting for the City of London, it may be, as Mr. Sayer admits, that it would have been better for the City to have kept the work in its own hands; "but it is easy to be wise after the event." The Commission of Sewers deemed it preferable, in the public interest, to allow electric lighting to be developed by private enterprise; objecting to enter into what at the time was a doubtful speculation. "Experience must always cost something; and in the home and centre of commerce the public should not grumble if the cost of leading the way is sometimes evident." This is the right and proper manner of looking at the question.

Some of the measures glanced at by the Joint Select Committee of Parliament on Electrical Energy Generation and Supply, whose report was specially discussed in last week's "JOURNAL," have been considered and disposed of by a Committee of the House of Lords presided over by the Earl of Northbrook. The Metropolitan Electric Supply Company's Bill proposed to establish a large generating station at Willesden, and to bring the current into the Company's areas of supply by a conduit laid along the Grand Junction Canal. The proposed station, in effect, was to be a northern analogue of the Deptford establishment. Thus is Mr. Ferranti justified of his opponents. The Metropolitan Company find themselves short of station room. Consequently, they have decided to go outside, and build an electricity generating factory which with the trunk connections will cost close upon half a million sterling. The London County Council wanted to insert clauses in the Bill giving them the power of purchasing the undertaking as a whole. The suggestion failed, on the ground that the Council are not one of the Local Authorities to whom powers of purchase are reserved by the Electric Lighting Act. If the Council desire to proceed upon the resolutions passed by the Joint Select Committee, they must come to Parliament for the purpose, as suggested in the Committee's report. The St. Giles's Board of Works, one of the Local Authorities having at present the right of purchasing their portion of the Company's undertaking, objected to the Bill as proposing to nullify these rights by the removal of the generating works. The opposition was futile; the Committee declaring the preamble of the Bill proved.

The financial press has discussed, from its own peculiar standpoint, the situation illustrated, rather than created, by the decision of Parliament in regard to the Bermondsey and Marylebone Electric Lighting Orders. It appears from this discussion that "the City" had overlooked the fact that a limited and regulated competition in supply is one of the features of statutory electric lighting which the Board of Trade are careful to encourage whenever the chance offers itself. Yet nothing can be clearer than the intention and the wording of the Acts. In several Metropolitan districts there has been competition from the first. The various Electric Light Companies so competing are always ready and willing to extend into fresh fields and compete against other concerns. Of course, they do not like to be treated in the same way by anybody else, above all by a local authority; but such is the fundamental condition of the business. One newspaper sagely observes upon the question that "no general principle seems to run through legislation affecting the rights and privileges of capitalists who embark their money in furnishing the community with comforts and facilities which are greatly needed." This is nonsense. The idea of monopoly in any public service is foreign to British legislation; and it is expressly excluded from the Electric Lighting Act of 1888. To argue that the letter of this Act is different from the intention of its framers in this regard, is waste of time and energy.

THE LESSON OF PHILADELPHIA.

SECOND ARTICLE.

RESUMING with Dr. Rowe the consideration of the case of the Philadelphia municipal gas undertaking, we come to his account of the manner in which the period of municipal administration came to an end. Ever since 1883, combinations of capitalists had been scheming to get control of the business; but it was reserved to the United Gas Improvement Company to carry off the prize. Dr. Rowe admits that, whatever the nature of the political forces set in operation by the Company, they were greatly aided by the attitude of a large portion of the business community, for whom the prospect of obtaining gas of better quality at a lower price overshadowed for the time being all other considerations. It is argued that as a result of this combination the permanent interests of the city were lost sight of. This was, of course, no affair of the United Gas Improvement Company. It is further stated that the Company secured an exclusive privilege upon too easy terms; but this is an aspect of the "deal" which is chiefly of local interest. It is Dr. Rowe's principal complaint that, whereas "the consideration in return for a franchise should be determined on the basis of the value of the privilege," in this lease there is no provision for disclosure of what the lessees make out of it. This omission strikes Dr. Rowe as a grave defect; and it is a view that most people in this country would also take. British gas legislation proceeds upon the principle of the rigid connection between selling price and undertakers' profits. Both are defined and limited. This principle has been lost sight of in the Philadelphia lease, as to which the only question which interested the grantors was whether the Company were prepared to give better gas at a lower figure than the old Gas Bureau. The observation is made that "had the terms of the lease been formulated with reference to the possibilities of profits to a company enjoying a monopoly of the gas supply, the results would have been different."

The lease as finally signed gives to the Company a monopoly of the supply for thirty years. At any time prior to July 1, 1907, the City may terminate the lease, on condition of reimbursing the Company for all improvements, *plus* 6 per cent. simple interest on the cost. Dr. Rowe declares that the option thus given can never be exercised by the City, because the amount that would have to be paid would increase the City debt beyond its constitutional limit. In return for their exclusive privilege, the Company engage as follows: First, to supply gas of 22-candle power at the price of $1 per 1000 cubic feet. Secondly, to pay into the City treasury upon all gas sold prior to Jan. 1, 1908, all sums received in excess of 90 c. per 1000 cubic feet; after Dec. 1, 1907, and prior to Jan. 1, 1913, all sums in excess of 85 c. per 1000 cubic feet; from Dec. 31, 1912, to Jan. 1, 1918, all sums in excess of 80 c. per 1000 cubic feet; and from that time until the expiration of the lease (Dec. 31, 1927), all sums in excess of 75 c. The Council have power to fix the actual selling price of gas at these dates at the figures given, in which event the City will receive no money rental. Thirdly, to light, free of all charges, all public buildings and lamps, and to provide for the lighting of 300 additional lamps every year. Fourthly, to expend within three years $5,000,000 in alterations, improvements, and extensions, and at least $15,000,000 for the same purpose during the thirty years of the lease. Lastly, on the expiration of the lease, the City is to receive back the works without charge in first-class working condition.

At a first glance, as Dr. Rowe admits, these provisions appear to assure a large return for the franchise. He insists, however, that one cannot be certain of this without knowing what are the corresponding possibilities of profit to the lessees. These hinge upon the question of the cost price at which the Company can reasonably expect to make gas. Dr. Rowe argues that this price will be considerably reduced immediately and in the near future. He believes that it will not cost the United Gas Improvement Company more than 10 per cent. more to make gas in Philadelphia than the actual cost of the same quality of gas in Glasgow or Birmingham. His point is that the Company will net 90 c. per 1000 cubic feet for all gas sold for private lighting in Philadelphia until Dec. 31, 1907, while it will only cost them 35 c. per 1000 cubic feet to manufacture and distribute. If this is the case, it will undoubtedly be good business for the Company.

Apart altogether from the consideration of the lease from the business standpoint, there remains the general question of the expediency of such an abandonment of a municipal function. Dr. Rowe laments that the attitude of the populace to this phase of the question furnished a striking illustration of the poverty of American communities in civic ideals. He argues that in parting with the gas-works Philadelphia deprived itself of the power of performing an important social service—meaning that a municipal gas supply should be used for something more than merely getting money by the sale of certain products of the industry. He points to the important part played by gas in the economy of modern life, and thinks it indubitable that this part will be a greater one in the years to come. Here, again, he refers to the experience of English cities for enlightenment; and this what he finds: "At the time the gas-works were placed under municipal control in Glasgow—and the same statement applies to the other cities of Great Britain—the use of gas was limited to the well-to-do classes. After careful study and inquiry, the municipal authorities came to the conclusion that to introduce its use for cooking and illuminating purposes by the working classes, particularly in the thickly-settled tenement districts, would work radical changes in their mode of life. The wastefulness of the coal stove, and the comparatively high cost of its maintenance, had given to uncooked foods an important place in the standard of life of these classes—a fact that seriously affected their industrial efficiency and physical vigour. The widespread use of alcoholic liquors was largely to be explained by the crude diet of the poorer classes. It was evident that the introduction of a new element into the standard of life could only be effected by the City through a temporary subordination of financial considerations. In order to facilitate the use of gas for illuminating purposes, automatic penny-in-the-slot meters were introduced." This is a very pretty picture of the deliberate combination of gas supply policy with philanthropy, hygiene, and the temperance cause; only unfortunately it is not strictly in accordance with the facts. It was not the British

gas-supplying municipalities, but gas companies, who encouraged the use of gas cooking-stoves, and introduced prepayment meters and free interior fittings. Glasgow certainly takes the lead among municipalities in popularizing the use of gas; but this is chiefly due to the fact that the supply is sold at cost price. All the other English Municipalities mentioned by Dr. Rowe follow the plan condemned by him in the case of Philadelphia, of making the gas profits subsidize the local rates. There are, of course, degrees of this practice.

In conclusion, Dr. Rowe condemns the Philadelphia Gas-Works lease because it is a bad stroke of business for the City, and because it is also a retrograde policy. He anticipates Mr. M'Dougall's suggestion, as contained in his letter in the "JOURNAL" for the 28th ult., that the most effective means of eliminating corruption is to "reduce to a minimum the functions which the Municipality performs," and agrees with us that "this method, in reality, increases the evil." The work of cities has to be done somehow; and whatever the City Government does not undertake, falls into the hands of corporate bodies who become more powerful than the regular authorities. This is especially the case in the United States, where "in those very classes that should furnish leaders in our civic life, we find waging the conflict between private interests and public welfare which usually results in the triumph of the former." The ideals of local patriotism have not yet succeeded in establishing themselves in the United States, outside the Universities; and every trade combination that is strong enough crushes the individual citizen and sets the local governments at defiance. "As regards Philadelphia, the danger is increased by the fact that the monopoly of the street railway and the gas and electric light service is vested in the same combination of individuals."

Dr. Rowe deplores the fact that just now, when a perception of the true relation between municipal activity and social progress is finding acceptance with a constantly increasing percentage of the American people, so discouraging an example should be offered by Philadelphia to other American cities. He cites the number of English and German Municipalities owning and managing their gas-works; and he wonders whether the cities of the United States will ever develop an equally efficient administration. "Upon their ability to do so depends the future of our democratic institutions." He perceives also that the process of improvement and development must be gradual. The people must be prepared for temporary discouragements, and to withstand the temptation to throw off the burden of public service in favour of private agencies. Until this is done—until the people are able to discriminate more clearly between the temporary and permanent interests of their Municipalities, in Dr. Rowe's opinion the road to good city government in the United States will remain closed. There is no short and easy way to sound local government. The order of historical development in this regard is complex; encountering difficulties which must be consciously met by every progressive society. "Temporary expedients may postpone, but cannot avoid, the vital problems of governmental activity. Their successful solution soon becomes the requisite for civic advance." Such is the professional pronouncement—a little pompous, perhaps, but undeniably true. We shall next have to see what Dr. Rowe's brother professor, Mr. E. W. Bemis, has to say upon the same subject.

Water-Hammer Action.—A fatality caused by an explosion of a steam-pipe near Bristol, has led a correspondent to call attention to the above subject in "Engineering." He points out how a small quantity of water in a steam-pipe may, under not unusual circumstances, cause loss of life. He takes the case of a 2-inch pipe, at the end of which steam at 100 lbs. pressure is admitted beneath (say) 4 lbs. of water, and asks what will be the probable result. A force of 314 lbs. producing motion in 4 lbs. of water equals in accelerative effect 2527 feet per second; and so the water, before it has been driven 2 feet along the pipe, will have acquired a velocity of 100 feet per second, which means the possession by the water of 624 foot-pounds of kinetic energy. Thus a small quantity of water may be rendered a very formidable projectile, the bringing to rest of which would probably require setting up a resistance of material considerably beyond that required to encounter the ordinary working force.

Calcium Carbide and Acetylene Patents.—Most readers of the "JOURNAL" will remember that during the past two years a very large number of patents have been granted for processes and appliances for the production of calcium carbide and for the generation of acetylene gas; but, according to some figures given in the "Electrical Review," they are only about half those applied for. In 1894, there were three applications, which were granted; in 1895, there were 35, of which 25 were granted; in 1896, the number was 180, of which 90 were granted; while last year there were 269, of which 104 only were granted. In the four years, there were 487 applications and 222 grants. The total number of this class of patents granted up to August, 1897, was as follows in the countries named: Germany, 21; Switzerland, 67; United States, 91. Our contemporary has not much faith in the pecuniary value of any one of the 222 British patents, and fails to see why so much time and energy should be devoted by inventors to the designing of acetylene generators.

PERSONAL.

Mr. G. E. VINT, Assistant Surveyor for the Eastern Division of Sheffield, has been appointed Surveyor and Water-Works Manager to the Holmfirth District Council.

Mr. HAROLD WOODALL has resigned the appointment he has held for the last twelve months as assistant in the Distributing Department of The Gaslight and Coke Company.

Mr. ARTHUR RHODES, Deputy-Manager of the Gaythorn Gas-Works, Manchester, was the recipient, on Monday last week, of a handsome case of cutlery, on the occasion of his marriage. The presentation, which was from the officials and workmen, was made by the Manager (Mr. John Merrell), who spoke in eulogistic terms of Mr. Rhodes, and wished him joy and happiness. His remarks were supported by Mr. E. Williams, Senior Chemist, and Mr. J. W. Bradbury, Chief Clerk. Mr. Rhodes, in a brief speech, suitably acknowledged the gift.

NOTES.

A Test of Motor Vans.

There have been a series of tests of motor vans for heavy traffic in the neighbourhood of Liverpool, which may be taken as representing the best performances possible of achievement by the most modern vehicles of the kind. Gas power, whether in the form of compressed coal gas or oil gas generated on the spot, was unrepresented on this occasion. All the motors were steam-engines; but liquid fuel and coal were used in different examples. Two Thorneycroft vans had coal-fired boilers; while the vans of the Liquid Fuel Engineering Company and the Lancashire Steam-Motor Company burnt oil. Which form of fuel is preferable seems to be for the present an open question. A contemporary remarks that oil is the lighter fuel, and in some respects the easier to handle. But it is not easy to take on board without spilling; and a very little spilt makes a great deal of unpleasant mess. It is questioned, also, whether the average driver will easily learn the management of the oil-burner. When once the thing is started, and so long as nothing goes wrong, the labour of stoking is done away with; but oil-burners often do not run for long without a hitch, and the volumes of pungent smoke then emitted from the chimney are a great nuisance. The oil-fired boiler has not the disadvantage of the so-called oil-engines by which so many motor cars are driven, but which in reality use benzine or light oil. Burning oil is procurable at any oil-shop; but not light spirit. Compressed gas seems to have dropped out of consideration.

A Report on Carbonic Oxide Poisoning.

Rather more than a year ago, Dr. Le Neve Foster, F.R.S., nearly met his death by carbonic oxide poisoning while investigating the circumstances attending an underground fire at the Snaefell Lead Mine, in the Isle of Man. A detailed report upon this accident has just been published in a Blue Book, which, according to "Nature," is not merely a statement of facts relating to the working of the mine, but also a document containing information which will prove of service to persons exposed to the risk of carbonic oxide poisoning. Dr. Foster alludes to the rarity of carbonic oxide in the atmosphere of mines, and states that when present it always comes from some artificial source. He found sufficient evidence to justify the conclusion that the deaths of the 20 victims of the Snaefell disaster were due to carbon monoxide produced by timber burning in the mine. It is startling to find how very little timber need be burnt to empoison to a dangerous extent the passages of a mine. Dr. Foster admits that the presence of 1 per cent. of the gas is quite sufficient to cause immediate loss of consciousness, followed speedily by death. He therefore recommends that the linings and fittings of all mine shafts and roadways should be made fireproof, unless naturally damp. The use of oxygen in restoring sufferers from carbonic oxide poisoning is referred to, and the keeping of a supply is recommended. With Dr. Foster's report is a report by Dr. Miller upon the physiological effects of carbonic oxide poisoning, and an appendix containing statements concerning the sensations, symptoms, and after-effects produced by breathing the gas.

The Examination of Fuels by Rontgen Rays.

An interesting statement concerning the employment of Röntgen rays in coal and coke testing has been submitted by M. Couriot to the Paris Academy of Sciences. The suggestion depends upon the transparency of carbon in all its forms, and the opacity of silicious and other impurities of fuel to the rays. M. Couriot has found it quite easy to form an opinion, by the agency of a powerful Crookes tube and a fluorescent screen, as to the purity of a fuel. On placing a lump of coal between the tube and the screen, all the details of the slag and clinker forming constituents of the mineral at once appear. M. Couriot has examined by this means numerous samples of anthracite, coal, lignite, peat, coke, and artificial block fuel. The finest silicious particles present, though quite invisible to the eye, show up at once on the screen as dark spots or bands upon the bright ground. Differences in the physical composition of a series of coal samples can be traced by this means step by step; thus disclosing at a glance the variations on the

quality of the fuel. The conglomerate structure of block fuel is clearly revealed; while in the case of coke the particles of iron sulphide are indicated by black spots on the fluorescent sheet. Carbon is so transparent to the rays that it is unnecessary to regulate the size or thickness of the test pieces, as the rough blocks, with sides following the natural planes of cleavage of the coal, serve perfectly well for examination. M. Couriot has successfully taken radiographs of coal samples from $1\frac{1}{4}$ to 2 inches thick, with a 10-inch spark and 5 minutes' exposure. It is evident that the equipment must be a powerful one to produce these satisfactory results.

Comparative Economy of Gas and Oil Engines.

It is remarked in "Engineering," with respect to the recent Cardiff show of the Bath and West of England Agricultural Society, that, though exhibitions of the kind follow one another pretty frequently, it is always possible to discover in the machinery sections a large number of improvements in detail—little things, perhaps, which might escape ordinary observation, yet important in their effect upon the space, the economy, or the simplicity of the work turned out. This appreciation was particularly easy in the case of the Cardiff show; and one of the circumstances of this display which particularly struck our contemporary was the unanimity with which the leading manufacturers are replacing gas-engines with oil-motors. The ostensible reason for this change is worth noting. It is not so much, the manufacturers say, that oil and crude petroleum oil are intrinsically more suitable than gas, or steam coal for that matter. It is rather because gas is an unattainable article for motive power in many parts of Rural England; costing from 2s. 10d. to 4s. per 1000 cubic feet, where a supply can be depended on. "When gas is 2s. 6d. to 2s. 10d. per 1000 cubic feet," said one of the "showmen" of the convertible gas or oil engines quoted by our contemporary, "it may pay to use gas; but when the price exceeds that charge, oil is in every way the cheaper medium, and it has the advantage of a capacity for use and control which even the ordinary labourer understands after half-an-hour's instruction." The statement is given for what it may be worth; but, in any case, it is expedient that the manufacturers of coal gas should learn from an independent source of information the limit of price at which the use of gas for power purposes is likely to be arrested.

The Proximate Analysis of Coal.

A Committee of the American Chemical Society have been engaged in considering the customary methods for the proximate analysis of coal, with a view to the adoption, if possible, of a uniform system for national use. After discussion among themselves, the Committee have formulated an outline method which they have published rather as a means of securing further information than as a final report. They request correspondence on the subject, which may be addressed to Professor A. Noyes, Rose Polytechnic Institute, Terre Haute, Indiana. It is suggested that at least 5 lbs. of coal should be taken for the original sample, with care to secure pieces that represent the average. The sample is to be quartered down; and the final sample powdered as quickly as possible. It is thought that drying the sample in *vacuo* for 20 hours over sulphuric acid gives the best results for this part of the analysis. Experiments were carried out by Mr. W. E. Burk, for the purpose of determining whether volatile matter other than water is lost in the drying of bituminous coals. The loss of such matter was always less than 0·7 per cent., and may therefore be disregarded. Directions are given for testing for loss of volatile combustible matters by heating over a bunsen flame. With regard to the determination of heating value, the Committee observe that a calculation of the results of 21 analyses, and determinations of heating effect with the bomb calorimeter, made with Indiana and Pittsburgh bituminous coals, shows that the heating effect may be found in all cases examined, with a maximum error of 2 per cent., by the following rule: Subtract from 100 the percentage of moisture and ash, and one-half the percentage of sulphur, and multiply the remainder by 80·7. The product will be the heating effect of the coal burnt to vapour of water, expressed in calories per kilogramme. The Committee will be glad of any data which will enable them to further test this factor.

COMMUNICATED ARTICLE.

PHOTOMETRIC STANDARDS.

By W. Grafton, F.C.S., of Beckton.

(*Continued from p.* 49.)

Experiments with the Methven Standard.

In making tests with this standard, only pentanized coal gas was used with the small slot and a $2\frac{1}{2}$-inch flame in the chimney. First, then, I will briefly review some work with this standard and candles made some nine years ago. The candles were not certified by the Gas Referees in 1887. Some of the most important work is by Mr. Dibdin, who made a series of comparisons with the standard candle and various proposed substitutes, as reported to the Metropolitan Board of Works, and published in the "Journal" on Aug. 9, 1887. In this report, Mr. Dibdin criticizes generally the proposed substitutes for the standard candle. A few extracts therefrom are worth considering and comparing with the results obtained nine years later.

Let us notice first a table giving the total number of tests made:—

Standard Employed.	Total Tests Made.	No. within 1 per Cent. of Mean.	Percentage No. within 1 per Cent. of Mean.	Value of Comparison Light by Standards.
Candles { (not certified) .	454	154	34	16·7
Pentane (Harcourt).	468	373	80	16·3
Methven	283	211	74	16·3
Pentane argand } (Dibdin) .	243	212	87	Not given.

Mr. Dibdin found that "the result of the very numerous tests which have been made with these two proposals clearly demonstrates that the Methven screen is an exact multiple of the pentane air-gas flame; . . . therefore, the Methven screen being equal to two average candles, and the pentane unit equal to half the value of the Methven, the pentane must be equal to exactly one average standard candle, which is the value claimed for it by the inventor. . . . The mean value given to the comparison flame by candles is 16·7 candles. The mean result of both the Methven and the pentane air-gas units is 16·3 candles respectively. So that, after including in the tests by candles many obviously incorrect results, I find that there is only a difference of 0·4 candle, which difference may be unhesitatingly ascribed to the faulty candles."

From these experiments Mr. Dibdin shows the Harcourt 1-candle standard and the Methven screen to be 2·4 per cent. too powerful; but, to equalize matters, he puts aside those candle tests that gave "obviously incorrect results." Why was this done, especially since he upheld them by including them in the final average? Surely they were not rejected because of burning more or less than the prescribed 126 and 114 grains of sperm per hour. No; that could not be, or they could not be called tests. The Referees instruct that "no testing is to be rejected on the ground that the result seems improbable." Those tests which were "obviously incorrect" ought to have been rejected at once, and not included as tests made at all, if any valid objection could be raised against them; and a test must not be objected to because it was made in a warm room, and consequently gave a higher return to the gas than would have been recorded at a lower temperature. We must accept the 16·7 candles as being the average of 454 valid standard candle tests. So far, then, these candle tests, made nine years ago, record a value to the Methven of 2·048 candles, and to the Harcourt air-gas flame one of 1·024 candles.

Using similar candles (Miller's) from the 15th to the 31st of May, 1893, the writer made a comparison with them, the Dibdin standard, and the Methven screen, against gas supplied from a small holder in the photometer-room on a 60-inch Letheby instrument, with the following results:—

Total No. of Tests.	Mean by Candles.	Mean by 10-Candle Standard.	Mean by No. 643 Methven Screen—Small Slot.	Difference between Candles and 10-Candle Standard.	Difference between Candles and Methven Screen.
102	15·89	14·57	15·82	1·32	0·07

In 1895 and 1896, certified candles make the Methven screen less than 1 per cent. out. The figures are as follows; the tests strictly complying with the Referees' Instructions, and the gas that was tested was supplied from a holder:—

Barometer.	Temp. of Room.	No. of Tests Made.	Mean by Certified Candles.	Mean by No. 536 Screen.	Value ascribed to Methven Screen.	Consumpt. of Sperm. Grains.
30·17	65·1°	1457	16·88	16·96	1·991	40·8

The comparison light varied day by day; but since a screen test was always checked by a candle test, this does not matter. It will be interesting to notice how well the candles burned if judged by the percentage number within 1 per cent. of the mean, although this is not a fair way of judging of the results, since the quality of the gas that was tested varied from day to day. The total average shows how well Mr. Methven did his former work, and also that the candles have not materially altered in light-value from those used in 1893.

		Per Cent.
Number of candle tests within 1 p. ct. of mean .	711	= 48·80
" " " " 2 p. ct. " " .	407	= 27·94
" " " outside these limits . .	339	= 23·26
		100·00
Number of screen tests within 1 p. ct. of mean .	862	= 59·16
" " " " 2 p. ct. " " .	479	= 32·87
" " " outside these limits . .	116	= 7·97
		100·00

The above tests represent the work of five testers, and can therefore be relied upon.

Using Miller's uncertified candles having wicks of three strands of 23 threads each, very much the same results were obtained:—

Date.	No. of Tests Made.	Mean by Uncertified Candles.	Consumpt. of Sperm. Grains.	Mean by No. 580 Screen.	Value ascribed to Methven Screen.
June, 1896	60	17·02	40·57	17·04	1·998

A comparison was now made in the same photometer with

the 10-candle standard and a Methven screen, with the following results:—

Value of 10-Candle Standard.	Value of Methven Screen.	Barometer In.	Temp. Deg. Fahr.
10·455	2·00	29·96	75

The gas manufactured at Beckton and supplied to London was tested by a Methven screen; and on reaching the City it was tested with certified candles in the official stations by independent gentlemen, whose return must be accepted. The comparison dates from Nov. 5, 1895, to March 3, 1896, when the Dorset Buildings station was closed for cleaning. This is the coldest period of the year, and the most trying time for gas travelling. The loss is what might have been expected:—

Date.	Barometer. In.	Temp. Deg. Fahr.	Tests by Methven Screen.	Official Tests by Candles.	Difference. Candle.	Barometer. In.	Temp. Deg. Fahr.
1895.							
Nov.	29·97	63·3	16·91	16·64	0·27	29·89	68·6
Dec.	29·88	63·4	17·00	16·59	0·41	29·87	68·3
1896.							
Jan.	30·44	63·0	17·05	16·67	0·38	30·16	70·5
Feb.	30·42	63·0	17·03	16·69	0·34	30·30	69·4
March	29·37	63·0	17·10	16·95	0·15	29·27	68·2

Difference = 0·31

The above difference of less than 2 per cent. represents a result obtained by 2232 screen tests, and at least 303 candle tests. In the latter, probably more than three tests were made on some days. This is a splendid performance, and shows how well the screen works in practice. If, for the sake of argument, we look upon this 2 per cent. as representing the screen to be too weak, then deduct this from the result attributed to the Dibdin, and we still get 4·7 − 2·0 = 2·7 per cent. This means that, had the Dibdin standard been used at Beckton, the coal gas on reaching London would have gained 4½-10ths of a candle, which is an utter impossibility.

More recently we have equally satisfactory results, as may be judged by the following monthly averages:—

Date.	Temperature.		Illuminating Power.	
	Of the Air.	Of the Gas in the Main.	At Beckton Outlet.	Average of Official Tests.
1897.	Deg. Fahr.	Deg. Fahr.	Candles.	Candles.
April	46·2	..	16·55	16·50
May	51·3	61·8	16·46	16·54
June	60·3	64·5	16·46	16·59
July	63·3	68·2	16·58	16·68
Aug.	63·2	69·5	16·65	16·71
Sept.	56·4	63·8	16·50	16·59
Oct.	50·7	60·3	16·48	16·56
Nov.	46·0	56·6	16·50	16·52
Dec.	42·3	52·4	16·47	16·71
1898.				
Jan.	44 8	52·4	16·47	16·48
Feb.	41·8	50·7	16·55	16·58
March	40·3	50·2	16·54	16·54
Average	50·5	59·1	16·52	16·58
Number of tests.			14,688	3672

The Beckton daily average is the result of 48 tests, as compared with three official tests in each station. This is good reliable work, and results in showing the Methven screen to be considerably under 1 per cent. out.

The following experiments are given to show the effect of water gas on the Methven screen; it being used in admixture with coal gas in stated proportions. The standard of comparison was a Methven screen supplied with pentanized coal gas; and the figures are the average results:—

[Date, Aug. 17 to Sept. 29, 1897.]

Nature of Gas Supplied to Screen.	Quality of Coal Gas.	Quality of Carburetted Water Gas.	Power of Long Slot.	Power of Short Slot. (Pentanized Gas Used.)
			Candles.	
Coal gas only	17·00	..	1·994	1·993
5 p. ct. mixture	17·25	20·64	2·011	1·988
7 ,, ,,	17·25	20·64	2·011	1·981
9 ,, ,,	16·86	20·59	2·026	1·988
10 ,, ,,	16·80	20 77	2·033	1·982
12 ,, ,,	16·19	20·68	2·034	1·982
14 ,, ,,	16·15	20·38	2·054	1·988
16 ,, ,,	17·02	21·04	2·064	1·994
18 ,, ,,	16·99	20·50	2·084	1·993
20 ,, ,,	16·99	20·50	2·095	1·990
25 ,, ,,	15·44	20·02	2·122	1·990
30 ,, ,,	16·44	20·12	2·142	1·991
Carburetted water gas only.	..	21·51	2·472	1·989

From these results, it appears that there is no serious change in the value of the standard, using the long slot, until the gaseous mixture contains 14 per cent. and upwards of carburetted water gas. If, however, the gaseous mixtures are carburetted with pentane and the short slot is used, there is no change in the value of the light passing through it, even although the carrier of pentane is wholly composed of water gas. The percentages which have been chosen will, it is believed, cover all ordinary proportions of water gas with coal gas sent out by gas companies.

In practice, the Methven screen, supplied alternately with pentanized coal gas and pentanized carburetted water gas, recorded the following qualities to the gas from a holder. The results are the mean of many ten-observation tests of different gases by several testers, and bear out the above experiments:—

Quality of Gas under Test.

By Short Slot and Pentanized Coal-Gas Flame.	By Short Slot and Pentanized Carburetted Water-Gas Flame.	Greatest Variation from Mean.	
		Under.	Above.
21·11 candles	21·14 candles	0·60 per cent.	0·78 per cent.

Effect of Temperature on the Methven Screen.

As with the Dibdin standard, the greatest care is necessary, in carrying out experiments at a high temperature, to see that the air is pure, and not vitiated by products of combustion. By increasing the temperature of the carburetter, a difference of one-tenth of a candle was found, due to increased pentane vapour in the gas; this being equal to an increase in the power of the screen of ¼ per cent. for a range of temperature from 66° to 86° Fahr. By increasing the temperature of the room, the standard was reduced in value ½ per cent., due to pentane vapour and rarefied air.

The effect of moisture on this standard is very little indeed, as shown by Mr. Methven in his paper on "Photometry" in 1889, and may be neglected, since it does not affect the zone of maximum intensity to anything like the extent it does the lower and upper portions of an argand flame. As the temperature increases, the light from a flame increases in the lower region; while by a lowering of the temperature the light is augmented in the upper portion of the flame. We must take into consideration the variation in temperature which inevitably occurs in all testing-rooms. In the wintry months it is easy to keep the temperature between 60° and 64° Fahr.; but in the warm months of the year the temperature runs up 20° to 25°, and cannot be reduced below outside conditions unless the testing-room is in a basement.

The results of the following experiments clearly prove that the portions of the flame taken by Mr. Methven to form his standard are reliable between working limits with the ordinary air supply. He showed that, by using ordinary air between 50° and 90° Fahr., the illuminating power of the mass of flame at the level of the slot is augmented 2·6 per cent.; but up to 70° Fahr. no rise, but a tendency to fall, takes place.

Analyses of the Methven 2½-inch Pentanized Gas-Flame.

Temperature 70° Fahr.

Sections. Inch.	Candles.	Light Per Cent.	
2½ to 2½	= 0·530	= 3·356	
2 ,, 2½	= 0·816	= 5·167	
1¾ ,, 2	= 1·206	= 7·638	
1½ ,, 1¾	= 2·224	= 14·086	9·282 candles, or 58·79 per cent.
1¼ ,, 1½	= 3·340	= 21·155	
1 ,, 1¼	= 3·718	= 23·549	
¾ ,, 1	= 2·958	= 18·735	
0 ,, ¾	= 0·996	= 6·308	
	15·788	99·986	

Temperature 83° Fahr.

Sections. Inch.	Candles.	Light Per Cent.	
2½ to 2½	= 0·390	= 2·53	
2 ,, 2½	= 0·436	= 2·83	
1¾ ,, 2	= 1·372	= 8·93	
1½ ,, 1¾	= 2·146	= 13·97	9·186 candles, or 59·80 per cent.
1¼ ,, 1½	= 3·260	= 21·22	
1 ,, 1¼	= 3·780	= 24·61	
¾ ,, 1	= 2·980	= 19·40	
0 ,, ¾	= 0·992	= 6·46	
	15·356	99·95	

With this range of temperature there is a gain of 1 per cent. of light on the ¾-inch portion of the flame level with the slot. But the actual effect upon the portion opposite the slot, and used to form the Methven standard, is, of course, negligible, since the whole mass of flame level with the slot is increased by only 2·6 per cent. for a range of 40 degrees; according to the above experiments the flame is reduced 2·73 per cent. Now, with the Dibdin standard, for a range of temperature of 25° Fahr. the total flame was reduced over 12 per cent.

Difficulty in Adjusting the Height of the Flame.—With proper burners, there is not the slightest difficulty in setting a 2½-inch flame, provided the atmosphere is still; and even if slight draughts are present, a mean of the peaks and depressions of the flame should be taken as representing the true length. It will be found that no appreciable difference exists if the flame be so adjusted. But with all flame-setting, great care should be exercised in order to be accurate; and no test should be made with any standard that works with a definite length of flame until that flame remains constant to the line. To steady the flame in draughty situations, fine gauze could be fixed to the screen without affecting the standard. The glass chimneys for use with any standard should be thin, and stand vertical, and be always used, until broken, in one particular position, so that the amount of light passing through the glass may not be altered by defects in other parts of the chimney. They should be free from striæ or other markings, which may act

more or less like a lens. In fact, all chimneys for use with the standard should first pass through the Referees' hands; then there would be no cause for complaint with respect to faulty chimneys.

The burners used on the Methven screen are, or should be, certified by the Board of Trade; and if the latter, they are certainly reliable. There is one desirable improvement that might easily be made in this standard, and that is by securing the burner to the screen to prevent the distance being altered; as it will readily be seen that the nearer the burner is to the slot, the greater will be the light passing through the aperture, and *vice versâ*. In fact, the burner could be made of brass, and the cone also, or else of some less easily melted metal than that of which the present burner is made.

This standard is simple, cannot get out of order, and does not require any special precautions, except setting at right angles with the bar of the photometer. It burns gas which may vary considerably, since only a little is required to carry the pentane vapour. Professor Lewes, in his paper on "The Work of the Photometric Standard Committee," read before the Institution of Gas Engineers in 1895, characterizes the Methven screen as "the most convenient standard of light;" and certainly it is. The eyes are much relieved from strain by using the screen. As with candles, the disc is less illuminated; producing thereby a soft and comfortable sensation to the eyes, very unlike the distressing effect of the 10-candle standard. This is particularly the case after making a number of consecutive observations with that standard, which produces a sort of ablepsy, causing the operator to read quite abnormally. The desire for a standard having a higher power than two candles was principally to overcome the effect of moisture, &c., in the atmospheric air, and to facilitate the testing of high-power lamps. But the primary object is to test common gas, varying between 14 and 30 candles, as supplied to the public; and while we want a standard that is less variable than the sperm candle, there should be no departure from the ordinary method of procedure, which is quite accurate but for the varying standard. No alteration of photometers is needed, because to alter them means the introduction of probably greater errors than exist at the present time. A 10-candle slot could be fitted to the Methven screen in place of the 2-candle long slot, which latter is useless unless supplied with 15·7 to 17 candle coal gas. A 2¾-inch pentanized-gas flame would serve for either the 2 or the 10 candle slot.

(*To be continued.*)

TECHNICAL RECORD.

WESTERN (U.S.A.) GAS ASSOCIATION.

The Annual Meeting at Detroit.

(*Concluded from Vol.* LXXI., *p.* 1575)

A paper on the "Estimation of the Value of Ammoniacal Liquor" was read by Mr. O. O. Thwing, of St. Louis (Mo.), who described the usual methods of conducting a distillation test, the preparation of volumetric solutions of soda and of sulphuric acid, the indicator, &c. Of the latter, he preferred cochineal as being the only indicator that had a distinctive colour for the neutral condition. The accuracy of the solutions could be tested by making an examination of a known weight of pure ammonium chloride. The Twaddel hydrometer was useful as a preliminary test to determine the quantity of test acid, &c., to be used in the experiment. The saturation test was also described in detail.

An interesting discussion followed the paper; and many members stated their experiences in testing ammoniacal liquors. There was a general agreement that the Twaddel hydrometer, or the saturation test, was not sufficiently accurate; and the contracts should be based on the distillation test.

Mr. F. Egner, of Norfolk (Va.), followed with a paper on "Hindrances to the Adoption of the Inclined Retort System in America." He said that though the inclined retort was introduced as early as 1804, it had not been made a practical success till within the last few years. It now afforded the most rational means for securing the best all-round results; and as such, had not met with the recognition that one might with good reason expect. This might be ascribed to the well-known conservatism of gas companies in general, and to a laudable caution on the part of their engineers. Then there were the failures which attended the first introduction of the Coze system. It was possible to be over-cautious and too conservative, as was the case with water gas; and history might be repeated in this respect, in connection with the inclined retort, which was now largely used with satisfactory results. He argued that, while "let well alone" was a good motto, "Excelsior" was a better one. Then some companies had sought to impose conditions so outrageous that no sane contractor could accept them. For example, to erect and work the inclined retorts for two years, and the payment to depend upon satisfactory working during this period. Why should a contractor be asked to accept more onerous conditions with inclined retorts than with horizontal ones?

Discussion being invited, Dr. Moss said that the coke from an inclined retort was more free from breeze, and generally cleaner and better than from a horizontal one. There was no doubt that the leading gas engineers in England preferred inclined retorts. Speaking from experience, he said that the yield per pound of coal, and per retort per diem, were both improved; and the producing capacity of a retort-house could thus be increased to a large extent. Replying to questions, Mr. Egner said that the saving of labour was fully one-half, as compared with the ordinary system. He was assured that an inclined retort bench cost less than a horizontal bench of similar producing capacity. The yield of gas per pound of coal was about the same, and that of coke a little better, as there was not so much breeze. The saving in ground space was very marked. The inclined retort was suitable for works so small as to only require one bench at a time; and the retort could be readily charged, by simply dumping from a wheelbarrow, without machinery.

Mr. G. T. Thompson, of New York, read a paper describing the results of some inquiries he had made in England as to the use of isolated generators for retort-firing. In connection with the paper read by Mr. E. C. Carpenter, of Vauxhall, and the discussion thereon, at the November meeting of the Southern Association (England), he had inquired of the author respecting subsequent improvements, and had been furnished in reply with a description of isolated generators applied to inclined retorts. He had also been able to make a personal inspection of the installation; and he found that single producers erected at the back of the stack were applied to the heating of three benches, each containing eight retorts. The system, however, could not be made self-firing, or to admit of the use of red hot coke, as it would not be practicable to raise the lower or discharging end of the retorts above the level of the mouth of the producer. He submitted that the innovation would well repay attention and further trial.

Mr. Bredel opened the discussion by saying that he had tried outside generators in connection with the use of coal as fuel, and had been able, after some difficulty, to make them a success. But when it came to using coke, there was no advantage. In any case, the outside generator would mean considerably more fuel. The cost would be greater; and difficulties of a mechanical nature in connection with the controlling valves would arise. He knew of a first-class Siemens producer that was put in at Paris, and used 25 per cent. of the coke made. The draught, air supply, &c., required continual regulating, and careful adjustment; and he did not recommend the system. It might do for boilers or other low temperature work; but the high temperatures required in a retort-bench were a different thing. Dr. Moss did not see why it should not be possible to work as well with outside generators as with the ordinary system. In any event, the air supply, &c., must be carefully adjusted to secure the best results. Mr. Weber had worked detached generators on a large scale, and with great success. Mr. Doherty advocated the system as offering many advantages. Mr. Forstall thought it was not well to have too many eggs in one basket; and it would be awkward if a large producer failed or got out of order at a critical time. Mr. Egner agreed that there was much to think about in the paper, and moved the appointment of a Committee to make further inquiry. This was seconded by Mr. Butterworth and adopted.

Mr. E. H. Jenkins, of Buffalo (N.Y.), presented his report as Editor of the "Wrinkle" Department; and, as usual, this was of an interesting character. One useful suggestion was to insert a ring of sheet iron in the flange-joints of valves on large pipes, &c., with projecting pieces for extracting the same when required. Then, at any time when it might be necessary to take out the slide for repair or cleaning, the pipe could be blocked by pulling out the ring and inserting a plain sheet of metal in its place. Another idea was an electrical tell-tale for the station meter, consisting of an arrangement by which a circuit was completed each time any desired two pointers on the index were at zero together. This circuit caused a pencil to tap, and make a point on an ordinary pressure diagram; thus showing the time at which each thousand or ten thousand was completed. A simple contrivance for preventing the overflowing of gas-holder cups consisted of a hole drilled at a proper level in the outer ring of the inner cup. Any excess of water passed back, inside the outer lift, to the tank, instead of overflowing and running down the outside. For closing a gas-tap at any desired hour, a simple lever attachment in connection with any ordinary alarum clock was described. The clock is wound and set in the usual way; and the starting of the alarum disengages a catch and the tap closes by the falling of a weight.

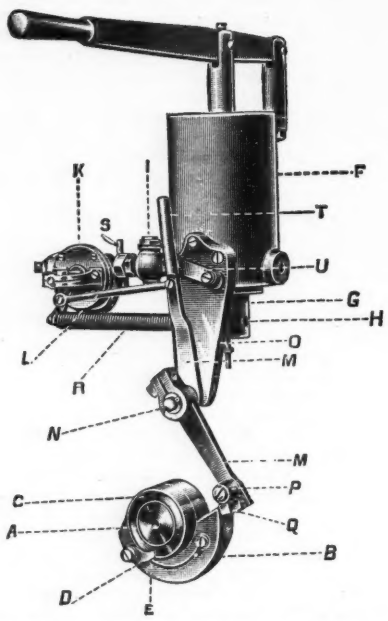
This concluded the business of the meeting; and the usual votes of thanks were embodied in one document, in the form of a report from the "Committee on Final Resolutions."

EDMONDSON AND DAWSON'S GAS-ENGINE STARTER.

The advantages to be derived from the use of an efficient starter for gas-engines are appreciated by every owner of a motor of this class of more than 4-horse power; but the various appliances which have been introduced up to the present time have, as a rule, been somewhat uncertain in operation. It is claimed for the starter which has been patented by Messrs. Edmondson and Dawson, an illustrated description of which is given below, that it is entirely free from this defect; its special features being that it gives an initial impulse automatically proportioned to the

requirements of the engine at the time, and follows this up by a further impulse at each cycle, until the ordinary ignition apparatus of the engine takes up the running, when the starter may be thrown out of gear.

The following is a description of the starter: A is the camshaft of the engine, revolving clockwise; B being the cam of the starter, loose upon the shaft. C is a collar set fast on the camshaft, carrying forward (clockwise) the cam B by means of the click D fixed on the cam, and dropping into the notch E on the collar. This leaves the cam free when the engine runs backwards. F is the pump, and G its valve-box, having an aperture H coupled to the gas supply, and a second aperture (not shown in the engraving) for admitting air. I is the check-valve, and K the ignition-valve; L, a link connecting the arm on the plug of the ignition-valve with the adjustable lever M, which moves on the stud N on the bracket O. P is a roller on the square stud Q on the lever; and R, a spring having one end attached to the arm on the plug of the ignition-valve, and the other fixed to the bracket. S is the pilot flame lighting a jet in the ignition-valve. T is the handle to the lever M; and U, the catch to hold the lever out of gear.



The action of the starter is as follows: The engine being set on the explosion stroke with the gas-cock turned on, and with the crank a little behind the top centre (the starting cam B having the square stud Q resting on it), and the exhaust-valve of the engine being set open, a charge of explosive mixture (gas and air) is driven into the cylinder by the pump F. When the cylinder is filled with the mixture, the exhaust-valve is closed. The pumping being continued, the charge is slightly compressed till it propels the piston slowly, and moves the cam forward (clockwise) till it drops the roller P into the gap, and releases the lever M. The spring R rotating the plug of the ignition-valve towards the right, ignites the charge in the cylinder, and propels the engine. If the pumping is continued so as to keep the connections between the pump and the cylinder full of the explosive mixture, the revolution of the cam, by opening and closing the ignition-valve and exploding the charge at the proper times, will give successive impulses to the piston; increasing its speed until the ordinary igniting apparatus takes up the firing, and the engine is effectually started. The starter is then thrown out of gear by pushing the handle T to the left, when the catch U falls and holds the lever, so that the roller stands free of the cam, and the action of the starter ceases.

There are three characteristics of this starter which, it is claimed, differentiate it from other appliances of its class. In the first place, the initial impulse being delivered on a piston already set in motion by the compression of the charge by the pump, is cumulative in its effect. In other words, the primary inertia of the piston having already been overcome, the influence of the initial explosion upon it is much greater than it otherwise would be. Secondly, the initial charge being compressed by the pump, the initial explosion is proportionately more powerful than in any starter working at atmospheric pressure. The result is that the initial impulse carries the running well over the first cycle, and the piston is moving steadily when it receives the second impulse. Thirdly, at the slow speed of starting by any self-starter, the proportions of gas and air in the charge drawn into the cylinder are frequently not ignitable by the tube. Hence the extreme difficulty of starting an engine by a single initial impulse. In the starter above described, the patentees claim that this difficulty has been entirely removed. It injects a flame into the midst of the charge, and will therefore ignite a mixture so badly proportioned that the tube would, in all probability, fail to fire.

LAYING PIPES UNDER WATER.

In the "JOURNAL" a few weeks ago, particulars were given (p. 1151) of some additional works which have lately been completed in connection with the Boston (U.S.A.) water supply, which came into the hands of the Metropolitan Water Board at the beginning of the present year. In the construction of the distributing system, a number of large sub-aqueous mains have been laid under conditions which present many features of interest; and the subject has been dealt with by the Chief Engineer of the works (Mr. F. P. Starns), in his third annual report. Some notes prepared therefrom appeared in a recent number of the "Engineering Record," from which the following particulars are taken.

The Charles River is crossed at two places by a line of 48-inch pipe, which is changed at the river to two lines of 36-inch pipe for convenience in construction, and to guard against the interruption of the water supply in case of accident. At one of these crossings, the pipe passes under the Boston and Albany Railroad before reaching the river; and the laying of these pipes without interfering with the passage of trains only a few feet above their top surface, was in itself a task requiring special care and patience. This part of the pipe-lines rests on a base of natural cement concrete 11 feet wide, with holes on its upper surface to receive the bell-ends of the pipes, which are 5 ft. 9 in. apart. On the other bank at this crossing, it was necessary to support the pipe on piles 6 feet apart. Gates are provided at both ends of each pipe, so that in case of accident to one a flow could be maintained through the other. The pipes for the river crossing were laid in a trench about 25 feet wide at the bottom and 8 feet deep on an average, which was smoothed down after dredging by a wooden plough attached to a boat, and drawn by a rope from a winding engine.

The work required 2031 feet of 36-inch pipe 1·65 inches thick, weighing 677 lbs. per linear foot. Three types of joint were used. One was like the ordinary joint, except that it had three turned grooves in the bell instead of one. The second type had a bell like the first; but the spigot was turned to a slight smooth taper, uniform in each joint of this type. After inserting one of these tapering spigots in the socket of a pipe, and running the joint with lead, the spigot could be withdrawn and again inserted, leaving the joint tight. The third type was a flexible joint. The spigot was made larger and thicker than usual, and turned truly spherical. On the inner surface of the socket, 8 inches from the end, there was a raised ring 1 inch wide, turned to fit the spherical surface of the spigot. There were five grooves in the socket, between the ring and end, to hold the lead. This connection permitted a deflection of about 1 in 10 without the spigot projecting into the waterway.

The pipes were put together on a platform on shore, in sections of six or seven lengths. At one end of the section was a tapered spigot, and at the other end a socket in which lead had been cast to receive the spigot of the next section. The section was then hung from a stiff truss about 75 feet long, which was lifted by two derricks on the pipe-laying punt, and held so as to just clear the gunwale. Mooring lines were run out in different directions, and by means of winches the punt could be hauled so as to hold the section suspended within a few inches above its true place. Then the section was lowered and moved as directed by a diver, until the spigot entered the leaded socket of the section previously laid. To assist in this operation, and to protect the lead from injury, a wrought-iron guide-ring was attached to the socket of each section before lowering. As soon as the taper spigot entered the guide-ring, a hook on the end of the piston-rod of a hydraulic cylinder attached to the truss was fastened to a chain fixed to the section of pipe already laid, and, by pumping water into the cylinder through pipes leading from the punt, the two sections of pipe were drawn together with much force. The joints were afterwards caulked by the diver. The flexible joints were used where there were vertical deflections in the pipe, and where it was thought there might be movement from future settlement. The second crossing of the Charles River is much shorter than that just described; but the pipe was laid in the same manner. Owing, however, to the narrowness of the stream, more flexible joints were needed.

A double line of 36-inch pipes was also laid across the Mystic River. In this case, 2625 feet of pipe were used for the twin lines. The mud in the bottom of the river was from 10 to 15 feet deep; so the pipes were laid on a pile foundation. Spruce piles were driven 12 feet apart, and capped with spruce timbers 10 inches square and 10 feet long. For a distance of 100 feet the tops of the pipes are about 10 feet below mean low water; but for the greater part of the distance across the river they are at mean low water. Five of the flexible joints already described were used on each line.

The 48-inch main which crosses the Charles River crosses the Malden River by another twin line of 36-inch pipes. This river is shallow, with its bottom at about the level of low tide, and there is little navigation at the point of crossing; so it was decided to lay the pipes within a cofferdam. Six-inch tongued and grooved spruce planks about 24 feet long were driven through the mud and sand into a stiff clay bottom. These lines were about 15 feet apart. The earth enclosed in this way was excavated, the water pumped out, and the pipes laid in the usual manner in open trench-work. About 94 feet of each line is horizontal. At either end the pipes rise on pile supports.

THE DECOMPOSITION OF GAS OIL, PHENOL, AND CREOSOTE BY HEAT.

(*Concluded from Vol.* LXXI., *p.* 1576.)

Summary of Results.

The results of the five principal experiments of which particulars have been given are tabulated below; the figures referring to 100 grammes of raw material in every case. The results of a sixth experiment on the fraction of turpentine oil which boils between 311° and 320° Fahr., are also given in the table.

—	Gas Oil.		Phenol.		Creosote.		Mixture of Gas Oil and Phenol.		Mixture of Gas Oil and Creosote.		Turpentine Oil.	
Grammes of material gasified per minute	0·50		0·44		0·20		0·34		0·52		0·23	
Cubic centimetres of gas evolved per minute	240		282		120		132		240		126	
Cubic centimetres of gas made	44,680		64,808		60,300		39,750		46,001		60,010	
Weight of one litre of the dry gas, in grammes	1·0120		0·5618		0·5999		0·7361		0·8151		0·6291	
Constituents of the air-free gas—	Volumes per Cent.	Grammes.	Volumes per Cent.	Grammes.	Volumes per Cent.	Grammes.	Volumes per Cent.	Grammes.	Volumes per Cent.	Grammes.	Volumes per Cent.	Grammes.
Ethylene	39·60	27·6	1·3	1·05	1·5	1·1	14·9	9·7	16·9	10·8	8·9	6·73
Carbonic oxide	1·70	0·9	30·8	24·90	29·2	21·9	14·7	7·3	16·9	9·6	3·2	2·46
Hydrogen	9·60	0·3	58·9	3·40	50·2	2·7	35 3	1 2	25·9	1·0	32·4	1·74
Methane	49·10	15·2	9 0	4·10	19·1	8·2	35·1	9·6	40·3	12·9	55·5	23·77
Totals	100·00	44·0	100·0	33·45	100·0	33·9	100·0	27·8	100·0	34·3	100·0	34·70
Grammes of distillate below 248° Fahr.	12·78		7·80		16·60		8·00		17·00		15·00	
Specific gravity of the distillate	0·801		0·910		0·899		0·91		0·903		0·888	
Grammes of benzene present	5·84		4·37		10·54		5·17		8·50		6·02	
Yield of products in percentages—												
Gas	41·00		33·40		33·90		27·80		34 30		34·70	
Separated carbon	—		29·00		28·30		1 90		0·40		1·40	
Tar and absorption in paraffin oil	51·50		27·90		31·70		63·70		58·80		51 90	
Loss, per cent.	4·50		9·70		6·10		6·60		6·50		12·00	

* There is a discrepancy between the figures in this column and those previously given (Vol. LXXI., p. 1395).—Ed. J. G. L.

manner to phenol; but the methyl group is split off, and by addition of hydrogen becomes methane, while the oxygen takes up a carbon atom from the benzene ring and forms carbonic oxide. These deductions refer to the gasification of the pure materials, with which a separation of as much as 50 per cent. of carbon occurs. In mixtures, the separation of carbon does not occur; and hydrogen and carbonic oxide are formed in large quantity. If the small quantities of carbonic oxide and hydrogen, which according to the tests are to be ascribed to the gas oil, are deducted from the total production of these two gases from the mixture, it will be found that 46 per cent. of the carbonic oxide, and 32 per cent. of the hydrogen theoretically obtainable from the phenol gasified, are actually obtained. With creosote, 67·3 per cent. of the carbonic oxide, and 21·9 per cent. of the hydrogen, are obtained.

These facts lead to the observation that the equations—

$$C_6H_5OH = CO + H + (C_5H_5)$$

$$C_6H_4OHCH_3 = CO + CH_4 + H + (C_5H_3)$$

apply also to phenol and creosote, when diluted with gas oil. But the residue (C_5H_5 or C_5H_3) of the molecule, in place of undergoing further decomposition and yielding carbon and hydrogen, unites with the decomposition products of the gas oil, and forms complex hydrocarbons; while a little hydrogen is split off. It is not clear whether the gas is impoverished in respect of olefines owing to the combined reactions. Observation, however, shows that gas oil alone yields 27 per cent. of olefines; but when mixed with phenol or creosote, it yields only 20 per cent. It is not possible to explain the formation of carbonic oxide and hydrogen on the assumption that water is produced and is subsequently decomposed by incandescent carbon, for water was only found in trifling amounts in the tar and paraffin oil; and moreover, at the temperature of about 1380° Fahr. at which the experiments were conducted, only one volume of carbonic oxide to three volumes of carbonic acid would be formed from water and carbon. The trifling amount of carbonic acid actually found in the gases precludes the possibility of such a decomposition having occurred.

The formation of benzene in the cases of phenol and gas oil is clearly due to a minor reaction, as the amount ranges from 3 to 6 per cent. of the weight of the products. With creosote, however, it is different. The amount is at least 10 per cent. It may be surmised that one of the cresols, after carbonic oxide has been split off, is able to re-form the aromatic ring by means of its methyl group. The ortho-cresol seems most susceptible to this change, which might also occur with para-cresol, but is improbable with meta-cresol. The occurrence of methane in the gases is intimately associated with the presence of the methyl group in the raw material. Haber's work has shown that the terminal groups are those which are split off in the process of decomposition by heat. Thus phenol, which has not a terminal methyl group, yields methane equivalent to only 3 to 4 per cent. of its weight; but creosote, which has one such methyl group, yields 8 per cent. of methane. On treating turpentine oil in a similar manner, nearly 24 per cent. of the weight of raw material was recovered as methane. This result is supported by an experiment made by Tocher.* It therefore appears that the more methyl groups readily susceptible of being split off there are in the molecule of a body, the more methane will be found in the products of its gasification. The yield of high molecular hydrocarbons isolated from the tar by means of petroleum ether was low; but nevertheless it diminished as the proportion of the low molecular phenol or creosote in the material gasified diminished. Thus there was obtained from phenol or creosote about 2 per cent., from the mixture with gas oil 4 per cent., and from the gas oil itself 6 per cent. of these high molecular hydrocarbons.

The composition of the gas obtained indicated that ethane was present in all cases in which gas oil was used, but in none of those in which pure phenol or creosote only was gasified. Though the values for ethane are within the limits of experimental errors, the deviations are nevertheless all towards one side, and lead to the conclusion that the ethane is produced only by scission, and is not built up. It should therefore only be found in the gas from a material in the molecules of which side chains with more than one branch exist. This observation is in consonance with Dr. Haber's views on the course of the pyrogenous decomposition of fatty hydrocarbons. The experiments also show that Scheithauer's statement† that a ton of creosote yields only 4900 cubic feet of gas, needs modification, since at the medium red heat of from 1300° to 1470° Fahr., which is used in oil-gas manufacture, a ton of creosote yields 21,536 cubic feet of gas. The yield diminishes very rapidly if the temperature is lower, as the phenols distil over without undergoing decomposition. This fact explains why oil-gas manufacturers have long since believed that phenols possess the property of deteriorating gas oils. The assay of gas oils according to the proportion of creosote they contain, finds justification, however, in the fact that the creosote effects a dilution of the oil gas with non-illuminating gases, the presence of which is observable through the influence they exert on the illuminating power of the gas.

An examination of the results indicates that the aromatic nature of the benzene molecule is weakened when complex groups replace hydrogen atoms in the combination. This is clearly shown by the results of the investigation of phenol. The presence of the divalent oxygen renders possible the production of carbonic oxide, which is not very stable at high temperatures. The only source of carbonic oxide from phenol lies in the benzene ring; and if a carbon atom is removed by the opening up of this ring, the combination C_5H_5 remains, and of necessity forms carbon and hydrogen as chief products, while olefines, methane, &c., are produced through subsidiary reactions, to a trifling extent. Creosote behaves in a similar

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Dr. Samuel Rideal has been awarded by the Council of the Society of Arts a silver medal for a paper read by him last session on "The Purification of Sewage from Bacteria."

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* See "Journal" of the Society of Chemical Industry, 1894, p. 271; or "Journal," Vol. LXIII., p. 478.

† See "Journal," Vol. LXXI., p. 1319.

REGISTER OF PATENTS.

Manufacture of Acetylene.—Preston, A., of Atherton. No. 12,263; May 18, 1897.

In this apparatus for the manufacture of acetylene, the patentee proposes to employ a ball-valve and float (to which is connected a stem provided with a spring at its upper end) operated by the gasholder at a suitable point in its descent, for admitting water to the carbide, and regulating the supply of gas from the generator into the holder. A back-pressure valve is employed on the upper end of the pipe conveying gas into the holder, so as to automatically prevent the return of gas on the removal of the covers during the re-charging of the generator. The acetylene is conveyed through divisions of a chamber containing suitable material or solution for purifying the gas generated previous to admitting it into the holder.

Prepayment Meters.—Silberberg, S., of New York, U.S.A. No. 12,454; May 20, 1897.

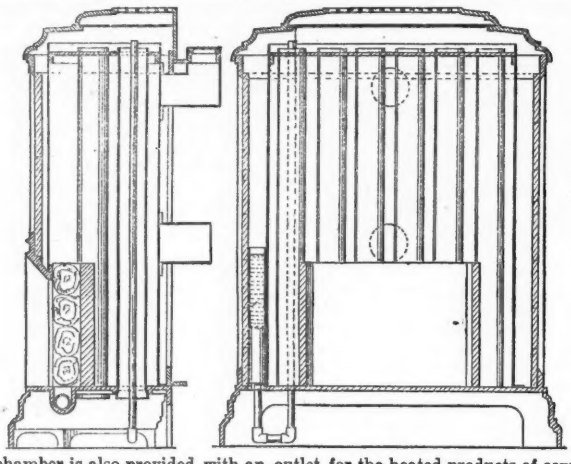
As explanatory of his arrangement of apparatus, the patentee remarks: "This invention relates to prepayment apparatus for fluid meters of the class in which it is necessary to insert a coin or other token, in order to get a supply of the fluid commodity. It is desirable to operate such devices with a token other than a coin; for the temptation to dishonest persons to break into the receptacle is not then so great. The token, whatever it may be, will be worth a certain amount of money; but as it is not a legal tender, the temptation to secure it by breaking into the apparatus is not great. It has heretofore been proposed to operate gas-meters by means of a coin; the insertion of the coin permitting the quantity of gas to flow which the coin pays for. In all such devices, as generally constructed, however, the apparatus is made to operate by a coin of a single denomination—as, for instance, by a silver 25 cent. piece. If more gas or water is desired than a single 25 cent. piece will pay for, it is necessary to insert a second or a third before it can be obtained. It is also found, in practice, that coins of the same denomination vary in size—due to wear, or to the fact that they belong to different series."

In accordance with the present invention, the patentee proposes to use for a token "a metal plate of peculiar design, which may be regarded as a key, and to construct the apparatus to be operated by keys of several designs." In this way, any quantity of the fluid may be obtained by inserting a key of corresponding design or value; the several keys representing different values.

The invention is not further described apart from a series of illustrations, and a lengthy lettered explanation.

Gas Heating-Stoves.—Langfield, J., of Manchester, and Kenworthy, J. H., of Ashton-under-Lyne. No. 12,756; May 24, 1897.

This invention in gas heating-stoves consists (as shown) in the combination with a bunsen or other suitable burner of a closed heating chamber, in the lower part of which the burner is fitted; the chamber being provided with air-tubes communicating at the top of the chamber with the place to be supplied with hot air, and at the bottom with a fresh air supply. One or more of the air-tubes is formed with a small internal tube, kept continually supplied with water; and the heating



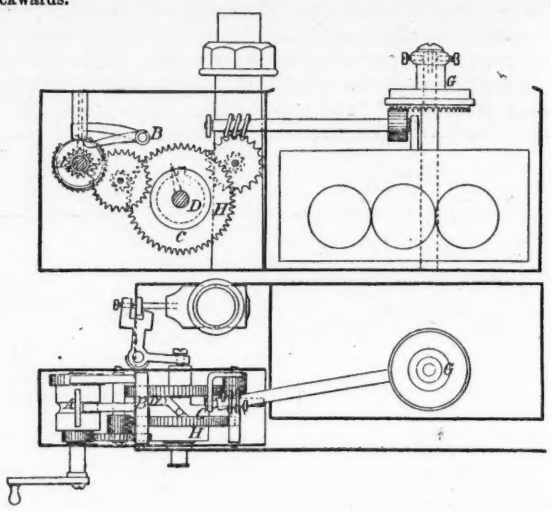
chamber is also provided with an outlet for the heated products of combustion at such a point in its height as to leave a considerable column of heat, which practically remains at a constant temperature. The heating chamber has also at the upper part a safety-valve, so that, in case the gas is turned on and not ignited until the mixture of air and gas in the heating chamber becomes explosive, the pressure in the heating chamber will be relieved, and so prevent its bursting and the flame issuing from the stove.

Coin-Freed Gas-Meters.—Lake, H. H.; a communication from L. P. V. Madsen, of Copenhagen. No. 13,547; June 1, 1897.

The claims advanced for this invention are—

1.—In prepayment or automatic gas-meters, in which the purchase-wheel C, which effects the opening of the gas-valve, may be rotated through a certain distance each time a fresh coin is inserted in the rotatable coin cylinder A, the arrangement by means of which the purchase-wheel is rotated either directly by a toothed wheel mounted upon the axle of the coin cylinder, or indirectly by means of an intermediate toothed wheel introduced between the first mentioned toothed wheel and the purchase-wheel.

2.—In prepayment gas-meters of the kind described in Claim 1, in which the rotation of the coin cylinder is normally effected by a two-armed stopper B arranged above this latter (one arm of which is raised by the coin inserted), the arrangement by means of which the other arm of the stopper forms a stopping pawl, the free end of which is provided with a triangular notch, and also that the teeth of the ratchet-wheel mounted either upon the coin cylinder or its axle, is cut away for a part of its periphery so that the stopping pawl, when its end engages with the portion of the ratchet-wheel not provided with teeth, prevents any rotation of the coin cylinder, while when its end in engagement with the teeth of the ratchet-wheel is raised, it prevents the coin cylinder from turning backwards.

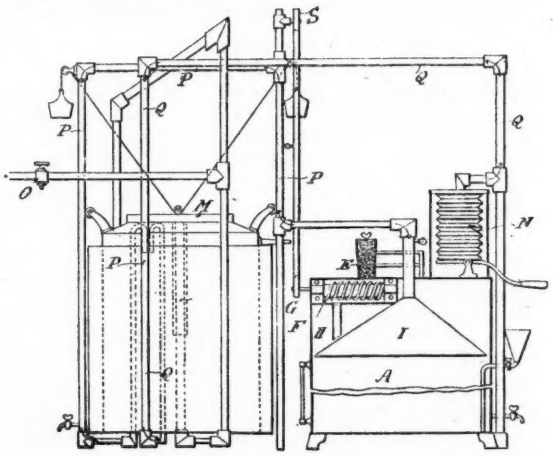


3.—In prepayment gas-meters of the kind described in Claim 1, effecting the opening of the gas-valve by means of the displacement of an axle or arm of a lever, so that the displacement is effected by a pin arranged upon the cylinder D, which is itself mounted upon the displaceable axle, and which cylinder likewise is provided with a large toothed wheel driven by means of the ordinary clockwork of the meter. This provides for backward sliding motion in the well-known manner; the pin resting in the slot provided in the boss H at the time of setting the apparatus. It is, however, forced by the rotation of the purchase-wheel to follow the oblique slot, thereby moving both the wheel and the axle into the position shown in the plan, owing to which the gas-valve is opened. There is an arrangement of stopper upon the boss H which fixes the greatest number of coins which may be inserted in the meter one after another.

4.—In prepayment gas-meters of the kind described in Claims 1 and 3, in which the backward rotation of the purchase-wheel C is effected by means of a toothed or crown wheel mounted upon the principal rotating axle of the drum of the meter, either the arrangement by means of which this crown wheel is connected with an index G, removably fixed upon the axle by means of a screw, in such a manner that it may be loosened and rotated independently of the axle, also that it may be readily exchanged for an index the crown wheel of which has a different number of teeth.

Production of "Oxycarbene" Gas.—Soxhlet, E., Van den Berghe, F., and Borremans Frères, of Hal, Belgium. No. 13,905; June 5, 1897. Date claimed under International Convention, Jan. 22, 1897.

The process of manufacture and of production of "oxycarbene" (so called by the patentees) by means of this apparatus, has especially in view "the use of acetylene gas derived from the carburets or acetylenes by eliminating the inconveniences and dangers which this gas presents in its preparation and its use."



The inconveniences and dangers of acetylene are thus enumerated—

(1) In most of the existing apparatus, the water falls on the carburet; and thus lime is produced—a reaction accompanied by a production of intense heat, which may be communicated to the gas formed, and be sufficient for the combustion of the latter. Besides, the carburet in presence of the small quantity of water is covered with a white layer of hydrate of lime, forming a coating, and preventing the subjacent layers of the carburet from being attacked by the liquid. Thus notable losses of the material occur. In the present apparatus, these inconveniences are said not to exist. The carburet falls into the water, and is totally decomposed; and the gas traversing the whole layer of water in the holder arrives cooled under the bell.

(2) Few appliances are provided with a scrubber, without which the

impurities in the produced gas are not removed. By means of the apparatus shown, the gas passing through the whole water in the holder arrives under the bell washed; the water having absorbed the sulphide of hydrogen, the ammonia, and other soluble gases.

(3) In all the present systems, the carburet is exposed to a damp atmosphere or is in contact with carburet already reached by the water. It therefore results that the part not yet attacked deteriorates quickly by absorbing moisture. A considerable loss of first material thereby results, and slow and untimely formation of gas, which not being able to disengage itself from the generator, when the apparatus ceases to work, accumulates in the latter, is compressed, and has a tendency to explode on account of its endothermic properties. This apparatus protects the acetylene or carburet completely against the water.

The troubles likely to arise during the use of acetylene are thus enumerated.

(1) It requires the use of special burners formed with capillary apertures. Under these conditions, a considerable part of the gas escapes complete combustion, as is proved by the carbon which is deposited under the form of soot. The apertures are very easily obstructed; and the burners often have to be renewed after some hours' use. The consumption suffers from it, and economical conditions are not realized. The process and apparatus now patented is said to allow the use of any burners now in use for lighting-gas. "No deposit of soot can be formed; and the whole carbon of the gas is integrally burned."

(2) The regulation of the gaseous afflux of acetylene burned in appropriate burners cannot be done. The burners must be totally opened or totally closed, on account of their small openings. The present process allows of regulation by taps and regulators inherent to ordinary gas-burners.

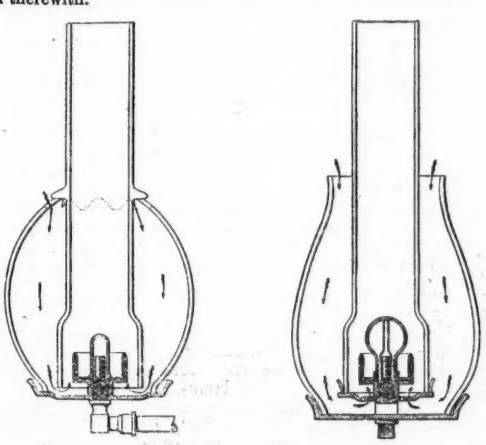
(3) The pure or unpurified acetylene being an endothermic gas—that is to say, susceptible of decomposing spontaneously and of combustion by the brisk heat produced by this decomposition—is a gas offering a permanent source of danger. This danger lies essentially in its brisk combination with the surrounding oxygen—a danger, of course, carried to the maximum when the gas is compressed or liquefied under pressure, by the fact that there is an enormous quantity of gas in a small volume. By means of the process and apparatus now to be described, the acetylene is consumed gradually and slowly, and diluted in order to reduce its endothermic power to the minimum.

A is the generator, into the lower part of which water is passed. E is a chamber for the carbide, pressed down by a spring. At the base of the chamber is a worm F, in connection with a delivery-pipe H. The shaft of the worm carries at one end a chain-wheel G. The moveable dome of the holder M is guided by the gas-pipes P. I is a collecting bell in the generator; and N is a bellows or blower of any suitable kind, to be worked by hand or otherwise. Its delivery-pipe leads to the pipes Q, which pass to the interior of the holder. By means of this device air may be pumped into the holder. On the frame is a chain-wheel S; and gearing the two chain-wheels S and G is a chain, on which is an adjustable stud. When the dome has risen so far that a finger moves the stud, the wheels G and S revolve. The worm F is thus revolved; and carbide is fed by it into the water in the generator, and acetylene commences to enter the holder. Having therefore, by means of the bellows N, pumped air into the holder until the dome M has risen sufficiently to cause the finger to move the stud (which has been adjusted so that this amount of air is exactly that required to give the desired proportion when the holder is filled up by the acetylene), the carbide will be then automatically fed, and continue to be so, by the rise of the dome M until it is full, whereupon there will be a mixture of air and gas therein ready for use.

O is the pipe for delivering the gas mixture. Close before each burner is placed a regulator and "flame arrester," consisting of rolled-up metallic gauze having on its outside screw-threads or helical ribs, and tapering to nearly a point at the end nearer the burner—such point being provided with a fine bore. This device reduces the pressure at the burner, and prevents any return of the flame to the holder.

Gas-Lighting Apparatus.—Muir, J. S., of Fulham, S.W. No. 14,240; June 11, 1897.

This invention consists of "a new method of treating gas to be used for lighting purposes, and of the atmospheric air required for supporting and assisting in the formation of the flame, and of the apparatus connected therewith."



The plan proposed is to enclose the gas as it leaves the gas-nipple in a "mantle" made of material capable of standing a great heat, sealed at its upper and lower extremities, and perforated around its side near its lower extremity to allow the gas to issue from the interior. The lower end of the mantle is surrounded by another mantle or burner of sufficient height to cover the perforation. This is closed at the bottom, but open at the top, so as to allow the gas as it issues to form the flame. The whole is then enclosed in a glass shade sealed at the base, but open at the top, and terminating with a serrated edge. On this is suspended a glass chimney having a flange round it for the purpose of effecting the suspension, and of sufficient length to cover the opening above mentioned for the escape of the gas at the top of the outer mantle, but not sufficiently long to reach the tray on which the shade rests.

The result of the invention is said to be that "the gas to be consumed becomes superheated to form the flame."

According to a modification, the mantle is enlarged or made bulbous at its upper part, so as to be in closer contact with the flame; the bulbous part serving as a gas reserve for feeding the burner with gas of a much higher temperature, from its retention in the bulb, than is possible by the plain mantle. The top of the bulbous mantle is also much higher than in that of the plain mantle, and enables a "concentrator" of the gas as it issues from the nipple to be employed, in order that it may strike against the hot dome of the mantle, and be the better deflected to spread downwardly to the gas-passage of the ring burner.

Recording Apparatus for Automatic Gas-Meters.—Beechey, C. G., and Wright, A. T., of Liverpool. No. 14,287; June 12, 1897.

According to this invention, there is proposed to be combined with an automatic gas-meter a recording diagram chart operated by the part moved when setting or moving the meter on inserting a coin; and a pencil adapted to mark the chart and record the movement of this part and the insertion of coins. The diagram chart is arranged to indicate the quantity of money introduced into the apparatus, corresponding with the money-worths of gas for which payment has been made, and also (by a special marking) each time the drawer into which the coins fall and are collected is moved, or access is had to the part in which the collection of the coins introduced takes place. Thus whenever access to this part of the meter is had, the fact is recorded by the diagram chart, and preferably, upon the line indicating the number of coins introduced—*i.e.*, the money-worths of gas paid for. The apparatus is also so adapted that the money-line is in the form of a continuous line; so that, by repeated revolutions of the chart, the recording in each revolution is clear of that in the former revolution. The chart consists of a rotating disc, with radial lines dividing the recording surface into a number of divisions—say, from one to twenty—each division, in this case, representing one shilling. The whole would therefore represent twenty shillings—that is to say, in the movement from one division to another, twelve pennies would have to be introduced, and the meter actuated as regards its automatic parts twelve times.

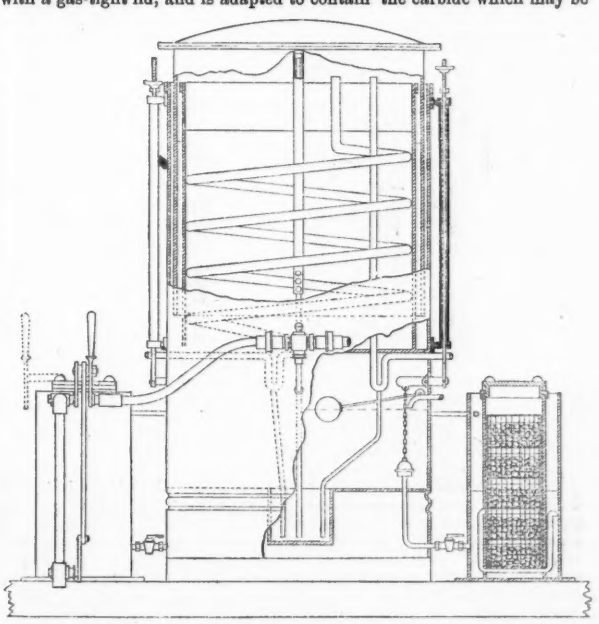
Manufacture of Gas.—Lake, H. H.; a communication from A. Piatti and Co., of Rome. No. 14,505; June 15, 1897.

This invention consists substantially in utilizing the products of combustion resulting from the burning of the straw of cereals or of any other vegetable substance, and in carburizing the products, either by mixing them with a certain proportion of acetylene gas or by other adequate means.

This object, say the patentees, is effected "by burning without flame, or carbonizing the straw or other vegetable substances in an apparatus constructed for the purpose, and collecting the gaseous products of combustion in a gasholder or other reservoir in which these products are mixed with a certain quantity of acetylene gas, which may vary from 10 to 50 per cent., according to requirements. Instead of the acetylene gas which serves for carburizing the gas, the carburizing may be effected by means of hydrocarburets or other equivalent substances."

Manufacturing Acetylene.—Fowler, T. R., of Liverpool. No. 14,742; June 18, 1897.

This generator (as shown) consists of an upright, and preferably cylindrical, vessel having double walls. The inner cylinder is provided with a gas-tight lid, and is adapted to contain the carbide which may be



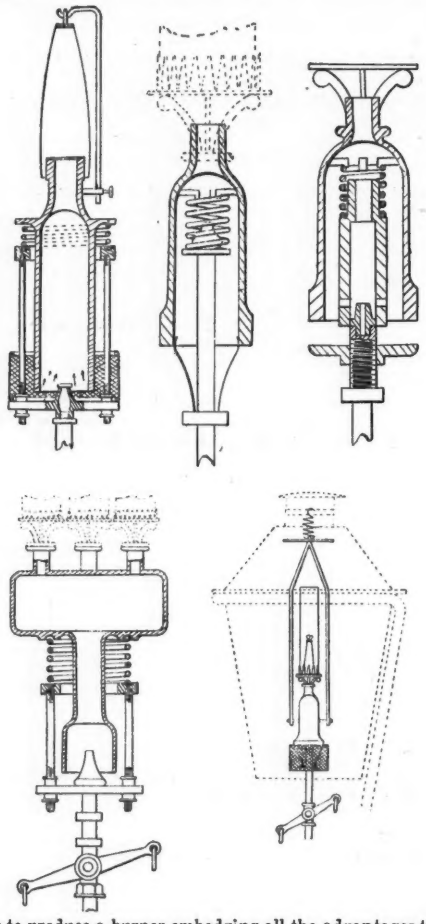
supported within it in a basket, cage, or otherwise in such manner as to leave a small clear space at the bottom. A feed pipe or tube passes through the inner wall into this space, and outside is turned in an upward direction—its outside portion lying between the two walls of the apparatus.

The mode of action is as follows: The carbide is placed in the inner cylinder; and, the lid being placed in position, water is fed into the space between the walls, and rises therein until its level reaches the top of the outer tube. At this point, a portion of the water will flow down the tube into the space beneath the carbide, and rising therein will cause the generation of gas as soon as it touches the bottom layer of the charge. The water inside the inner cylinder will lie above the entrance of the tube, and thus seal it and prevent leakage. The water-inlet to the main cylinder is preferably controlled by a spring or lever cock or valve, opened automatically when the supply of gas is so far used that a further feed of water is desirable. The gas exit-pipe is near the top of the inner cylinder. Each succeeding increment of water serves to raise the level in the inner cylinder, and to attack the carbide in an upward direction.

The holder consists of an upright vessel, divided by a partition into upper and lower portions. In the upper portion (which is double walled) floats the bell, as in an ordinary holder. The lower one contains the purifying chamber—a small cylinder depending from the partition, and adapted to hold the purifying material. The lower chamber is supplied with water; and this, surrounding the purifying chamber, serves to keep it cool, and also supplies the generator. The gas from the generator passes into the holder through a spiral tube; and in passing through it is cooled by the surrounding water. A second tube leads from above the water-level to the purifying chamber, from which chamber the gas is withdrawn for use. The spring or lever-cocks for the generators are opened by rods attached to the bell, when it sinks below a certain limit.

Supporting Incandescent Gas-Burners.—Clay, W. R., of Bolton. No. 17,679; July 28, 1897.

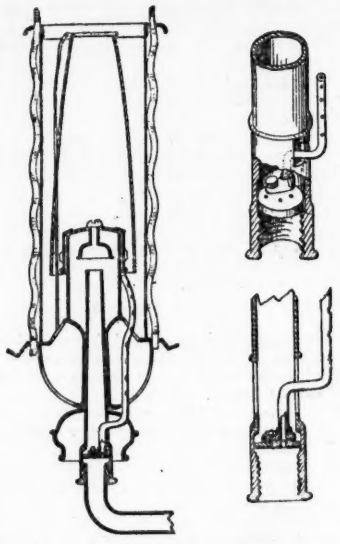
This invention relates to means for counteracting, intercepting, or diverting any or all jerky or violent vibrations or movements that might be transmitted through the burners and their bearings to incandescent lamp mantles, in public lamps and elsewhere. Heretofore the means employed for this purpose have consisted "of resilient bearings for the burners and their mantles, together with flexible pipe couplings for supplying the gas thereto, or the metal supply-pipe is bent or coiled to afford resilience for the burner and its mantle." As, however, these are somewhat unsightly, says the patentee, their use has been to a certain extent avoided.



In order to produce a burner embodying all the advantages that can be desired of it without the use of a flexible or resilient gas supply-pipe, the patentee proposes to construct the burner so that the part by which the mantle is supported is entirely carried and everyway held by resilient bearings, and that clear of all guiding-pieces or rigid stays. The method of construction followed for this purpose is shown in the accompanying selection of arrangements as depicted in the illustrations attached to the specification.

Lighting Incandescent Gas-Burners.—Lynd, C. T., and Miller, B. M., of San Francisco, U.S.A. No. 25,374; Nov. 2, 1897.

This gas-lighting device (as shown) consists of a diaphragm placed across the interior of the gas-pipe at some point between the ordinary gas-cock and the burner; the diaphragm having two or more perforations through it, in combination with a perforated lighting-tube having its lower end adapted to be placed in connection with one of the perforations, and to be disconnected therefrom after the gas is lighted. A swivel arm is pivoted to the diaphragm and adapted to have its free end swing over one of the perforations and a perforated lighting-tube connected at its lower end with the free end of the swivel arm, and adapted to pass through an opening in the gas-tube and thence to the burner-tip. This lighting-tube can thus be moved to register with one of the gas-passages, or be moved to one side to disconnect it from the gas-passage.



In lighting the gas at the burner-tip, the air case is first turned so as to bring the lower end of the lighting-tube in line with one of the perforations in the diaphragm. The ordinary gas-cock is then turned on full. The gas thus admitted into the gas-tube will be divided—one portion passing through the perforation in the diaphragm into the lighting-tube, and the other portion (which passes through the other perforations in the diaphragm) going up the gas-tube to the burner-tip. A lighted taper or match is then presented to the lower perforation in the lighting-tube, and the gas which issues is ignited. The flame is then carried upward from perforation to perforation in the tube until it reaches the top of the tube, where it ignites the gas that issues from the burner-tip. The air case is then turned so as to cut off the gas from the lighting-tube, and this extinguishes the line of flame that reaches to the burner-tip; and the gas which was cut off from the lighting-tube then passes up through the main tube to the burner-tip along with the gas that passes through the other perforations in the diaphragm. By this means the gas inside the mantle is lighted without any liability to explosion.

APPLICATIONS FOR LETTERS PATENT.

14,144.—Parkinson, F. B., "Generator for acetylene." June 27.

14,184.—Stamm, A. E., "Impregnating incandescent gas-mantles." June 27.

14,191.—Imray, J., "Improvements in incandescence baskets." A communication from J. Moeller. June 27.

14,196.—Smith, W. R., "Acetylene generators." June 27.

14,197.—Thompson, W. P., "Producing acetylene." A communication from H. Sez. June 27.

14,210.—Boult, A. J., "Production of acetylene gas." A communication from Suret et Cie. June 27.

14,225.—Cowan, W., "Automatically varying the load and pressure of gas-governors." June 28.

14,284.—Thompson, W. P., "Gas and other engines." A communication from T. H. Hicks, T. S. White, and T. Friant. June 28.

14,285.—Thompson, W. P., "Apparatus for generating and burning gas from liquid hydrocarbons." A communication from R. M. Snyder. June 28.

14,295.—Forbes, Sir C. S., "Enriching coal gas or the like." June 28.

14,362.—Shaw, E. J., "Rising and falling gas pendants." June 29.

14,387.—Donkin, E. Bryan, "Rotary apparatus suitable for use as exhausters, blowers, pumps, motors, meters, and the like." June 29.

14,428.—Kitchen, J. G. A., "Gas and oil engines." June 30.

14,432.—The British Acetylene Gas Generator Company, Ltd., and Spence, H. K., "Acetylene gas-generators." June 30.

14,438.—Ingram, S. J., "Charging coal gas and other retorts." June 30.

14,453.—Woods, J. E. T., and Byrom, W. A., "Manufacture of calcium carbide." June 30.

14,454.—Boult, A. J., "Incandescent gas-burners." A communication from G. Delin. June 30.

14,463.—Schodt, P. G. de, "Incandescent gas lighting." June 30.

14,476.—Titchett, J., "Gas-stoves." June 30.

14,485.—Lake, H. H., "Acetylene lamps." A communication from L. des Essards. June 30.

14,486.—Casgrain, H. E., "Carburetters." June 30.

14,505.—Armour, A. L., "Steam or gas turbines." July 1.

14,567.—Davoren, M., Belton, J., and Davoren, J., "Manufacture of illuminating gas." July 1.

14,616.—Fournier, M., "Production of acetylene gas." July 2.

14,620.—Smedley, E., "Acetylene lamps and generators." July 2.

14,634.—Jones, H. H., "Clearing gas service-pipes of residual deposits." July 2.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Bills:—

Bills reported, with amendments: Coventry Corporation Gas Bill, Cromer Gas Bill, Drogheda Gas Bill, Higham and Hundred of Hoo Water Bill, Middlesbrough Corporation (Gas) Bill, Plymouth and Stonehouse Gas Bill.

Bills read the third time and passed: Cranbrook District Water Bill, Crawley and District Water Bill, Cromer Gas Bill, Drogheda Gas Bill, Water Orders Confirmation Bill, Wigan Corporation Bill, Wishaw Water Bill.

The Earl of Camperdown has been appointed a member of the Select Committee on The Gaslight and Coke Company Bill in place of Lord Clinton; and he will be Chairman of the Committee.

The Wey Valley Water Bill has been referred to a Select Committee, consisting of Lord Ribblesdale (Chairman), Earl Grey, Viscount Falkland, Lord Methuen, and Lord Muncaster; to meet on Monday, July 11.

HOUSE OF COMMONS.

The following further progress has been made with Bills:—

Bill read the first time and referred to the Examiners: Water Orders Confirmation Bill.

Bills reported: Folkestone Water Bill, Gas Orders Confirmation Bill (No. 1), Halifax Corporation Bill, Keighley Corporation Bill.

Bills read the third time and passed: Blackpool Improvement Bill, Gas Orders Confirmation Bill (No. 1), Sheringham Gas and Water Bill, Yeovil Corporation Bill.

Electric Lighting Undertakings.—A Select Committee of the House of Lords, presided over by Lord Northbrook, had under consideration last week three important Bills relating to the supply of electricity. One was promoted by the Chelsea Electricity Supply Company, with the object of obtaining power to acquire additional lands and erect generating stations. It was opposed by the London County Council, who claimed to be the lighting authority, under the Electric Lighting Act, for certain parts of the County of London, and moreover to have the power of supervising and controlling the lighting by the Vestries. The Committee passed the Bill with the addition of a clause securing to the Council the powers conferred upon them by the Chelsea Electric Lighting Order, 1886. Another Bill was that of the Metropolitan Electric Supply Company, who propose to establish a large generating station at Willesden, and convey the current into their district by means of cables laid along the Grand Junction Canal. This Bill was passed with amendments limiting the Company's operations to their present area, and retaining the existing conditions. The third Bill was promoted by the Central Electric Supply Company, at the back of whom were the Westminster and the St. James's and Pall Mall Company, to obtain power for the acquisition of land and the construction of works for the supply of electrical energy, and other purposes. It was opposed by the London County Council, the Great Central Railway Company, and three electricity supply companies; the Railway Company putting forward a prior claim to the site selected for the generating station. In this case, the Committee decided that the preamble of the Bill had not been proved.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—QUEEN'S BENCH DIVISION.

Tuesday, July 5.

(*Before Mr. Justice* WILLS.)

Hughes v. Erith Urban District Council.

This case was before his Lordship and a Special Jury for several days towards the end of last month (see "JOURNAL" for June 28, p. 1581), and resulted in a verdict for the plaintiffs; but the question as to how judgment should be entered was reserved. This matter was decided to-day.

Justice WILLS said he should first consider whether the plaintiffs were entitled to be paid by the defendants for their work in repairing the air-mains laid down by them. The material facts might be very shortly stated. In 1895, the defendants made a contract with one Ossington, by which he undertook to lay down a line of drain-pipes through their district. It was part of the defendants' scheme that these drains should be combined with a system of air-mains afterwards to be constructed, through which compressed air should be forced along the drains; and by this agency the sewage was to be lifted to a higher level. Ossington completed his work in the part of the system with which this case was concerned in March, 1896. On the 7th of May following, the defendants entered into a contract with the plaintiffs to lay down air-mains and construct the rest of the apparatus necessary to lift the sewage. The drain-pipes were some 20 to 30 feet, and the air-mains between 2 and 3 feet below the surface. The plaintiffs finished their work in October, 1896; and as the Jury had found, it was properly done. Ossington was at this time at work on another section of the drains; and, as his work was not forward enough for the plaintiffs to follow on, they left the neighbourhood, and did not return until 1897. When they left, their air-mains were tight; but on returning they were found to leak. The plaintiffs complained to the defendants' Engineer, asserting that the leakage was the consequence of imperfect work—he not filling up his deep trenches, which led to lateral subsidence of the soil in which their air-mains were laid. He replied that he would require them to test their mains up to 40 lbs. when the whole work was finished, and that he had nothing at all to do with any subsidence. As, under the contract, the plaintiffs could not be paid for any part of their work without the certificate of the Engineer, they had to repair the mains, which they did at a cost of £244 odd, the sum claimed in the action. The defective state of their mains, the Jury found, was due to the lateral subsidence occasioned by the imperfect way in which Ossington filled in the trenches which he had had to cut to lay the drain-pipes. Under the terms of the contract, the plaintiffs were obliged to do the necessary work of repairing; and the question appeared to him (Justice Wills) to be reduced to this: Was the disabled state of the air-mains due to the default of the defendants within the meaning of the contract? He entertained no doubt that, outside the contract, no such duty could be established. In his opinion, the expression "default" in the contract was not confined to questions of actionable negligence, or of failure to perform specific obligations; nor did he see anything in the nature of the case to confine it to things that might happen in the future. "Default of the defendants" seemed to him to include failure to do something which ought to have been done somehow, and which the defendants were the natural and proper persons to do or to have done. The simple question was: Was it owing to the default of the defendants that the mischief arose? It would not do to say that the injury resulted from the default of Ossington, and that this was not the default of the defendants. The defendants caused a hole to be dug in the ground, and when they failed to fill it in properly they made default in what was their proper and natural work, and even their legal duty, though not a duty towards the plaintiffs in the sense that a right of action could be based upon it. In his opinion, the default was one on their part within the meaning of the contract, and the plaintiffs were entitled to be paid the sum in dispute. It was said that the plaintiffs had wrongly conceived their cause of action. But this was a matter which could be remedied by amendment; and the defendants had suffered no damage from the form of the action. Accordingly, he gave judgment for the plaintiffs for £244 15s., with costs.

Complaint of Nuisance at the Bath Gas-Works.

In the Chancery Division of the High Court of Justice last Thursday, Mr. Justice Kekewich had before him the case of *Carr and Co. v. Bath Gaslight and Coke Company*, by which an injunction was sought to restrain the defendants from polluting the River Avon by permitting the escape of effluent water from their works to the detriment of the plaintiffs in their business of cloth manufacturers, carried on lower down the stream. Mr. Phipson Beale, Q.C., reminded the Court that an arrangement had been made for inspection of the gas-works when the matter was last mentioned. Experts had accordingly visited them, and the results were now given in the affidavits; among them being one by the defendants' Engineer and Manager (Mr. C. Stafford Ellery). He stated that the particular process complained of had been discontinued, but that the defendants intended to resume it at any time they chose. In the circumstances, an injunction was necessary. Mr. Butcher, Q.C., for the defendants, said the cause for complaint at the tank mentioned in the evidence had been removed. Mr. Beale said the question was not in reference to a tank at all, but to a particular process which the defendants expressed their intention of resuming. His Lordship suggested that, as probably the trial could not take place before the Long Vacation, an arrangement should be made in the meantime to keep matters *in statu quo*. After some discussion, Mr. Butcher agreed to give an undertaking not to discharge into the river any residual product or effluent arising from the process in question. His Lordship, on this undertaking being given, granted leave to set down the case for trial at once; either side to be at liberty to make application to the Court if necessary.

In re the Self-Lighting Gas Company, Limited.

This was a petition by the above-named Company, for whom Mr. Levett, Q.C., appeared, asking the sanction of the Court to the reduction of capital by returning money not required. The Company was formed in 1895, with a nominal capital of £200,000, in 20,000 shares of £10 each. Only 2000 shares, however, had been issued, which were all fully paid up. The Company was formed to acquire and work certain patents, a great many of which had been sold; and the business now consisted mainly of the receipt of royalties. The result was that it had in the bank £16,000 which was not required. A special resolution had therefore been passed, which not only provided for the repayment of the £16,000 of capital, but also divided each of the remaining unissued shares of £10 into five shares of £2 each, so that all the shares issued and unissued would be on the same footing; £8 per share being returned to the holders of the 2000 shares already issued. An advertisement had been published by the direction of the Master, and he had made his certificate that there were no debts or liabilities. Justice North, before whom the matter came last Saturday, made the order as asked.

Action as to Ventilating Apparatus.

In the Chancery Division of the High Court of Justice last Wednesday, Mr. Justice Bigham, sitting as an additional Judge of the Division, had before him the case of *Simmance v. Sugg and Co.*, in which the plaintiff, Mr. John F. Simmance, sued the defendants for royalties alleged to be due under an agreement by which he granted to them a licence to manufacture certain articles he had patented (No. 18,801 of 1889). The royalties were claimed in respect of two classes of articles manufactured by the defendants. The first was an apparatus used on torpedo boats for the purpose of creating a down-draught into the vessel. An apparatus similar to that invented by the plaintiff was used for the purpose of preventing a down rush of water. His Lordship ruled that this apparatus would not have been an infringement of the plaintiff's patent, and that therefore no royalties were payable in respect of it. The second class of articles in respect of which royalties were claimed were ventilators fitted by the defendants with valves and cowls of their own design. The defendants said as to these articles that they were only liable to pay royalties for the valves, and not in respect of the whole article manufactured. His Lordship said he was satisfied that, under the contract, the defendants were liable to pay to the plaintiff 10 per cent. upon the net price of the

whole of the apparatus manufactured by them. The royalty was on an apparatus which included any adaptation by the defendants. There was a counterclaim by the defendants on account of the plaintiff having made and sold gas-fire ventilators under the patent in question during the existence of the licence granted to the defendants. This was admitted by the plaintiff, and an injunction was granted against him. His statement of the profit made was, however, accepted by the defendants, who were credited in the account with £30 damages and £38 for goods. No order was made as to costs.

Use of Gas Companies' Reserve Funds to Meet Extraordinary Claims.

At a recent sitting of the Barnsley West Riding Police Court, Mr. Raley applied on behalf of the Elsecar, Wentworth, and Hoyland Gas Company, for permission to take from the reserve fund of the Company the sum of £470 11s. 9d., funds invested in the Lancashire and Yorkshire Railway Company, for the purpose of meeting an extraordinary claim within the meaning of the Gas-Works Clauses Act. He explained that the Company had to construct an additional main between Elsecar and Hoyland, and the money was required for the purpose. The 32nd section of the Gas-Works Clauses Act, 1847, provided that a gas company should have power to use the money for such work, if the consent of two Justices of the Peace was obtained. There was no opposition; and the Bench assented to the application.

A Manchester Gas Official's Sentence for Embezzlement.

At the last Manchester Quarter Sessions, before the Recorder (Sir J. F. Leese, Q.C., M.P.), George Frederick Bateman pleaded guilty to indictments charging him with stealing £484 11s. 0½d., the money of the Lord Mayor, Aldermen, and Citizens of Manchester, on the 21st of April last; and with embezzling sums of £126 0s. 7d., £226 17s. 2d., £110 15s. 4d., £48 19s. 3d., £258 7s., and £20 0s. 11d., on the 8th of January last, and subsequent dates. The accused had been in the service of the Gas Committee of the Corporation for a great number of years—first as a collector, and afterwards as cashier; and his defalcations amounted in all to about £1730, the whole of which had been taken in twelve months. The amounts specified in the second indictment were moneys received under the prepayment meter system. The accused was charged at the City Police Court on May 5 (Vol. LXXI., p. 1076), when the nature of the frauds and the method of their detection were explained. Mr. Woodroff Fletcher appeared for the prosecution, and stated that the prisoner had previously borne a good character, and that, while his salary had been £275, he had had something like half-a-million of money passing through his hands annually. The Recorder said the prisoner's offence was a terrible one, and he could have no pity for him. He would be sentenced to three years' penal servitude.

Pollution of the River Wey.

At the Guildford Police Court, a few weeks since, the Guildford Gas Company were summoned, at the instance of the Thames Conservancy Board, for polluting the Wey. Mr. W. S. Bunting prosecuted; Mr. R. Sparkes, the Company's Solicitor, defended. Mr. Bunting said the offence alleged was admitted, and steps had been taken by the Company, since complaints had been made, to put an end to the pollution. The Conservators' Inspector had visited the works, and considered the improvements that were being made would be effectual and satisfactory. Under these circumstances, Mr. Sparkes would ask for a mitigated penalty; and he (Mr. Bunting) in view of the Inspector's report, would be satisfied with a small fine. Mr. Sparkes said the Company had acquired a piece of land which was formerly a cricket-ground. It appeared that the ground had surface drains laid to drain the cricket-pitch; and when the land came to be used for the purposes of the gas-works there must have been some overflow into the pipes, and then into the ditch with which they were connected. The Company had dug a trench and filled it with puddled clay. They had also taken up the pipes, of the existence of which they had not been aware, and had stopped all openings effectually. He therefore asked for as small a penalty as possible, as this was neither a gross case nor a wanton infringement of the law. The Bench imposed a fine of 40s., and £5 18s. costs.

Supply of Acetylene Gas by a Gas Company.—The Cowdenbeath Gas Company, Limited, have resolved to supply acetylene gas. The contract for the provision of the necessary plant has been let to the Home and Colonial Acetylene Gas Company.

Birmingham Corporation Coal Contracts.—The Gas Committee of the Birmingham City Council have completed contracts for 490,000 tons of coal for the twelve months from the 1st inst. The quantity is smaller than that used last year; and this is owing partly to the increasing production of water gas, and partly to the stocks of coal in hand. Last year the contracts were for approximately 510,000 tons; but the water gas produced added to this amount gave an equivalent in coal which would have necessitated a consumption of 527,000 tons. The price is 6d. per ton more than that of last year.

The Coalville District Council and the Local Gas Undertakings.—The Chairman of the Coalville District Council (Mr. W. D. Stableford), at a recent meeting, proposed that the necessary steps be taken for promoting a Bill in Parliament, to enable the Council to purchase the works of the Whitwick Gas Company. He believed all the members agreed that this was a wise thing to do. The benefits to the ratepayers would be that the Council would be able to supply gas at a less cost than the Company; and the profits would be applied to public purposes. The motion was carried unanimously. Mr. Heward subsequently moved that the Ibstock Gas-Works be purchased at the same time, seeing that a part of the district was lighted by the gas supplied from them. After a discussion, the matter was adjourned to the next meeting.

MISCELLANEOUS NEWS.

THE LONDON COUNTY COUNCIL AND THE SUPPLY OF CARBURETTED WATER GAS.

The Public Control Committee of the London County Council have presented the following report on the above matter:—

We have received a letter from the Departmental Committee of the Home Office which is considering the questions of the manufacture and supply of water gas, asking for the opinion of the Council on the subject. Having considered the matter, we have come to the following conclusions, and have communicated them to the Departmental Committee: (*a*) That considerable danger arises from the introduction of water gas in the process of the enrichment of coal gas. (*b*) That non-carburetted and non-odorized water gas should not be allowed to be used under any conditions, since it is devoid of smell which would give warning of any escape of the gas. (*c*) That 25 per cent. should be the maximum amount of water gas allowed to be introduced in the enrichment of coal gas; the proportion of water gas being ascertained by determining the amount of carbonic oxide in the enriched coal gas, which shall not exceed 16 per cent. Coal gas enriched to this extent would correspond in poisonous character to the Dowson gas, which is already in use for heating purposes and for gas-engines, and would exclude the use of carburetted water gas. (*d*) That when it is proposed to supply poisonous enriched gas to houses and the interior of buildings, a proper inspection be made of the service-pipes by a responsible officer appointed by the local or other suitable authority, who should certify that the pipes are in a sound condition, and that there is no escape of gas; and that the cost of such inspection be borne by the gas company.

THE SULPHATE OF AMMONIA COMMITTEE.

The Work and Plans of the Executive.

The First General Meeting of the subscribers to the above Committee was held on Wednesday last at the Offices of the Chairman (Mr. W. G. Blagden), 4, Fenchurch Avenue, E.C.; but as there was little information to be furnished beyond what appeared in the report of the Executive Committee and that already published in the "JOURNAL," the attendance was not large. Mr. BLAGDEN presided.

The report dealt with the work of the Executive from the date of the formation of the Committee (July 29 last) down to June 30. The first step taken was to offer prizes to agricultural societies, &c., for the best grown crops with the aid of sulphate of ammonia, or in conjunction with other manures. In response to the circular sent out, the Secretaries of about 65 societies undertook to bring the subject before their Committees; and this had resulted in some 50 societies organizing competitions for prizes of the value of £10 each. Then a prize of £50 was offered to, and accepted by, the promoters of the Brewers' Exhibition for the best exhibit of barley for malting purposes grown with the aid of sulphate of ammonia. Prizes of £5 each had also been offered to, and accepted by, the Scottish National Fat Stock Club for the best beasts, fed on sulphate of ammonia grown turnips in five classes, exhibited at their show. It had also been decided to give a prize of £5 for the best sheep, fed on sulphate of ammonia grown turnips; and a prize of £5 for the best sulphate of ammonia grown turnips and swedes exhibited at the show. The report next referred to the literature which had been circulated. Of the pamphlet on "The Science of Manuring," by Mr. John Hunter, about 120,000 copies had been distributed; and of that by Mr. Middleton, who wrote as a practical farmer with experience of sulphate of ammonia, about 135,000 copies. The report next announced that it had been arranged that Mr. Hunter should act as Agricultural Adviser to the Committee for one year, commencing in November, 1897, at a salary of £150, upon the undertaking that, should his services be still further required, this amount should be increased to £200. It was further decided to expend a sum not exceeding £500 on a series of advertisements in twelve of the principal agricultural periodicals and about 100 provincial papers. These advertisements appeared early in March, and continued until the end of May. Alluding to their decision to offer a prize of 500 guineas for the best essay on the "Utility of Sulphate of Ammonia in Agriculture," the Committee mentioned that they had secured the services of Mr. W. C. Little, Member of the late Royal Commissions on Agriculture, and Dr. Voelcker, Consulting Chemist to the Royal Agricultural Society, to act as Judges of the essays; and these gentlemen had appointed Mr. Samuel Rowlandson, a Member of the Council of the Royal Agricultural Society, to act as Referee, in case of any difference arising. The Committee considered they had every reason to be satisfied with their labours so far as they had gone; but the benefit of the year's work could not be fully appreciated until the results of the numerous competitions were known and tabulated. The accounts showed that the subscriptions received amounted to £2669 1s. 6d. (106,763 tons, at 6d.); and two other small items in connection with the issue of the pamphlets made the total receipts £2683 14s. 1d. Deducting the expenditure (of which the two largest items were advertising, £547, and printing and distributing pamphlets, £491), a balance of £1228 3s 2d. remained. Adding to this £6 1s. 4d. subscriptions outstanding and £2 10s. for sales of pamphlets give the Committee £1236 14s. 6d. But they are committed to the following expenditure in connection with competitions: £525 for the essay on sulphate of ammonia; £100 for the remuneration of the Judges; £550 for prizes to agricultural societies, &c.; £50 for prizes to National Scottish Fat Stock Club; and £50 for the prize for malting barley at the Brewers' Exhibition. Salaries and travelling and sundry expenses made up a total estimated expenditure to Dec. 31 next of £1544. A further levy will therefore have to be made to meet the difference, and to enable the Committee to prosecute their work.

The report having been taken as read,

The CHAIRMAN said, as it was fairly ample, he did not propose to trouble those present with many remarks; and he would simply add a few words. In the first place, with regard to the prizes which had been

offered, he thought he ought to tell the subscribers that, although they had managed to get about fifty agricultural societies to undertake the work of organizing competitions for prizes for the best crops grown by the aid of sulphate of ammonia, the anticipations of the Executive had not been by any means realized. In all, they sent out 611 circulars to societies of various kinds; but only about 60 were prepared to go on with the matter. Half of those were in Scotland; and the other half were confined to a few English counties—Yorkshire, Derbyshire, and Lancashire. It therefore appeared that there was a very large area of the country which they could not touch at all in this way; but he thought that, if the Committee continued their labours for another year, they might perhaps be able to devise some means of getting at those areas—perhaps by appointing paid judges of their own, who would themselves organize the competitions.

Mr. W. R. CHESTER (Nottingham) inquired if the Chairman could tell them where the failure came in. Did the societies who had not taken up the competitions express any reason as to why they did not?

The CHAIRMAN said they simply did not answer; so that the Committee were in absolute ignorance as to why they did not accept the offer. Not 10 per cent. replied to the invitation to organize competitions. Then with regard to the prizes they were offering to exhibitions and shows, the Committee would no doubt in another year, if they continued their work, be able to do considerably more, because they would be better known, and would be in a stronger position to appeal to the committees who organized the shows; and, moreover, they would be in the field much earlier. Before the Committee were able to do anything in regard to the present year, many of the organizing committees had already made their arrangements. As to the circulation of the pamphlets which had been prepared, the Committee had distributed 25,000 of each among the farmers in Scotland; from 40,000 to 50,000 of each had been sent to the members of the Committee; and from 15,000 to 20,000 had been forwarded to the landed proprietors of England. The Committee did not see their way to getting at the farmers in England. They were very numerous; and there was no machinery for reaching them properly. Therefore the pamphlets had not been sent out to them from his office; but no doubt many of the individual members of the Committee had distributed copies among the farmers in their own immediate locality. Then again, with reference to advertising, they were unfortunately late in commencing. Instead of starting as they ought to have done quite early in the year, it was not until March that they were able to get their advertisements out to the bulk of the papers; and besides that he did not think the selection of the provincial papers was perhaps quite so good as it might have been. But in future, they hoped to have the benefit of the advice of the members of the Committee as to the proper mediums in their own localities for making sulphate of ammonia better known. Regarding the prize which it was proposed to offer for an essay on the "Utility of Sulphate of Ammonia as a Fertilizer," the Committee had had considerable difficulty in finding proper Judges for the competition. However, they had succeeded at last in getting hold of suitable gentlemen; and the necessary advertisement, in its final form, had been adopted, and was ready for insertion in scientific journals as soon as the requisite expenditure was sanctioned. It would be noticed in the accounts that the subscriptions received represented only 106,763 tons of sulphate of ammonia; whereas the total quantity produced in the United Kingdom was estimated at something like 200,000 tons. It was very much to be deplored that they had only got a comparatively small proportion of the total number of manufacturers to join the Committee; and they hoped that those who still stood out would in future be prepared to bear a certain portion of the burdens which the work entailed in view of the benefit which they obtained from the labours of the Committee. He concluded by proposing that the report be received, and the accounts (subject to audit) be adopted.

Mr. ISAAC CARR (Widnes) seconded the motion, which was at once unanimously adopted.

A brief discussion ensued as to the appointment of Auditors for the accounts to June 30 last. The names of Mr. S. Y. Shoubridge, Mr. Charles M. Ohren, and Mr. H. D. Ellis were suggested. With reference to the nomination of Mr. Ellis, the CHAIRMAN mentioned that the Commercial Gas Company were not subscribers, so that it would be of no interest to Mr. Ellis to undertake the work. It seemed to be the general opinion that a firm of Chartered Accountants should be appointed; and eventually, on the motion of Mr. CHESTER, seconded by Mr. ALFRED COLSON (Leicester), Messrs. Alfred Lass, Wood, and Co. were selected.

Mr. FYFE (of Young's Paraffin Lighting and Mineral Oil Company, Limited) next moved—"That an Executive Committee be appointed, with full power to appoint officers, to take such steps as they think fit in the interests of sulphate of ammonia manufacturers, and to levy subscriptions as required on members, not exceeding in the whole 6d. per ton, during the ensuing year.

Mr. C. A. CRAVEN (Dewsbury) seconded the motion, which was agreed to.

Mr. FYFE said that following the previous resolution was a list of the names of the gentlemen who had been working during the past twelve months; and, in order to simplify their proceedings, he would propose that they be re-elected. The names were: Messrs. Fraser, Kennedy, and Fyfe, Colonel Sadler, Messrs. Orr, Craven, Dempster, Blagden, Lennard, F. Livesey, Brotherton, and Hanbury Thomas, Alderman Miles, Messrs. Brunner, Mond, and Co., the Bradford, Salford, Leicester, and Nottingham Corporations (represented by Messrs. Wyld, Woodward, Colson, and Chester respectively), and Messrs. Carr and Harman, of the Widnes and Huddersfield Corporations.

Mr. J. W. HELPS (Croydon) seconded the proposition, which was unanimously adopted.

On the motion of Mr. HANBURY THOMAS, seconded by Mr. HELPS, Messrs. Alfred Lass, Wood, and Co. were further appointed to audit the accounts for the current year.

Mr. CRAVEN moved a vote of thanks to Mr. Blagden for the interest he had taken in the work of the Committee during the past year.

Mr. E. A. HARMAN, in seconding, remarked that the time and energy Mr. Blagden had devoted to the work were beyond all praise. He had undertaken an immense amount of work—not only in issuing the pamphlets, but in the detail work, besides which the use of his office had been most acceptable to the Committee, in its early stages at all events.

The motion was carried by acclamation.

The CHAIRMAN, in reply, said he need not say he was very grateful indeed for this cordial vote of thanks, and the kind way in which it had been proposed. He could not, however, really take much credit to himself for what had been done. He was nothing more than the willing servant of the gentlemen who formed the Committee; and if he had succeeded in carrying out their wishes to their satisfaction, to know he had done so was all the reward he required.

This concluded the proceedings.

THE EXAMINATIONS IN GAS MANUFACTURE.

The Pass List.

The following are the names of the successful candidates in the last examinations in "Gas Manufacture" by the City and Guilds of London Institute, the question papers for which were given in the "JOURNAL" for May 10 last (p. 1077):—

HONOURS GRADE.

First Class.		*Second Class.*	
Cowper-Smith, A. T.	Pettigrew, W. E.	Davies, H.	Shadbolt, F. L.
	Power, J.	Jennings, G. L.	Taplin, E. W.
Dougan, O. W.	Smith, H. E.	Knight, H. S.	Thomas, J. M.
Moon, P. G. G.	Williams, P. E.	Page, H. C.	Williams, H. R. S.

ORDINARY GRADE.

First Class.		*Second Class.*	
Alderman, S.	Hamson, E.	Auty, J.	Kershaw, J.
Astbury, E.	Heald, W.	Ball, A. F.	Kitson, H.
Bagshaw, A. H.	Hunter, F. R.	Barrett, F.	Lancaster, W. T.
Berry, J.	Johns, W. H.	Bissell, A. W.	Lemmon, N. G.
Branson, A. W.	Keillor, G.	Brady, W. J.	London, T.
Brittle, J.	Matterface, H.	Brock, W. E.	Loveridge, C.
Bunch, H.	Page, C. W.	Brown, A. E.	Manning, F. E. F.
Carpenter, S. A.	Paternoster, F.	Buckley, W.	Menzies, T.
Clarke, S. J.	Smith, S. T.	Caton, W. E.	Moorhouse, J. L.
Duncan, G.	Stokes, H.	Clowes, C. P.	Newton, W. H.
Emery, J. I.	Studholme, J. H.	Cross, G. H.	Nuttall, L. W.
Green, H.	Taylor, N. J.	Duff, W.	Oldfield, F.
Halliwall, S. E.	Wilson, H. F.	Duxbury, W. T.	Ousey, T.
		Fenton, F.	Port, H. N.
		Gales, P. F.	Reid, N.
		Garlick, R. H.	Reilly, E. P.
		George, W. T.	Robb, D.
		Green, J.	Robinson, F.
		Green, W.	Ruggles, H. G.
		Greenwood, D. A.	Shadbolt, W.
		Harwood, B.	Shaw, E.
		Haynes, B. S.	Thomson, W.
		Herdman, G. H.	Townsend, W. W.
		Higginson, F.	Weaver, A. S.
		Hunter, R. W.	Wellens, E. J.
		Hydes, J.	Wilson, W.
		Jackman, J. W.	Wilson, W. R.
		Jackson, P. B.	Wimhurst, H. R.

MANCHESTER CORPORATION GAS SUPPLY.

Annual Report and Accounts.

We have received from the Superintendent of the Manchester Corporation Gas Department (Mr. Charles Nickson) a copy of the report of the Gas Committee, with an abstract of the accounts for the year ending March 31 last. The Committee record the progress of the undertaking as follows:—

The number of tons of coal and cannel carbonized, including the equivalents of enriching materials, and the quantity of gas and residual products made per ton carbonized, as compared with the previous year, are as follows:—

	Coal and Cannel Carbonized. Tons.	Gas per Ton. Cub. Ft.	Coke per Ton. Cwt.	Coke For Sale. per Ton. Cwt.	Tar per Ton. Gallons.	Am. Liq. per Ton. Galls. (to oz.).
1898	407,236	10,210	12·82	8·39	12·44	28·06
1897	408,064	10,243	12·51	7·65	12·80	29·43

The illuminating power of the gas sent from the works was equivalent to 19·51 standard sperm candles, as against 19·16 for last year.

The high temperature which was experienced during the winter months has affected the consumption of gas. The quantity transmitted from the works shows a decrease of 28,819,000 cubic feet, or 0·69 per cent., as compared with an increase of 419,769,000 cubic feet, or 11·16 per cent., in the previous year. The total output and the quantity unaccounted for, compared with the previous year, are as follows:—

	Gas Sent Out. Cub. Ft.	Unaccounted for. Cub. Ft.	Percentage of Loss.
1898	4,153,520,000	148,549,000	3·58
1897	4,182,339,000	174,952,000	4·18

The number of gas consumers on the 31st of March, 1897 and 1898, was respectively as follows:—

	Within the City.	Beyond the City.	Total.
1898	92,082	20,181	112,263
1897	82,577	18,070	100,647
Increase in 1898	9,505	2,111	11,616
Increase in 1897	12,031	1,374	13,405

The percentage of private consumption was as follows:—

	1898.	1897.
Within the city—Ordinary consumers	82·26	84·84
Prepayment "	3·05	1·28
Outside the city—Ordinary "	14·51	13·82
Prepayment "	0·18	0·06
	100·00	100·00

The use of prepayment meters has greatly extended during the year, and has proved a great boon to the tenants of cottages. The number of

these meters in use at the end of the financial year was 22,761, as compared with 13,959 in the previous year—an increase of 8802, of which 7885 have been fixed in the city and 917 in the out-townships. The quantity of gas consumed by these meters was 117,187,000 cubic feet—an increase of 68,401,000 cubic feet, or 140·21 per cent., on the previous year. A large number of these meters have been in use for a short period only; and it is estimated that during the ensuing year the consumption by these means will be upwards of 200 million cubic feet.

The application of gas for purposes other than lighting continues to increase. The decision of the Committee to fix gas-cookers at a small percentage on the cost has given a great impetus to the use of these appliances. The number of gas fires, cookers, and other appliances on hire on the 31st of March was 5188, and the number of gas-engines in use 1424, as compared with 4094 and 1275 respectively for the year ended March 31, 1897. The quantity of gas used by cookers, fires, and engines is estimated at 285 million cubic feet; being an increase of 14 per cent. on last year's figures.

The total amount of revenue was £553,642, as compared with £552,816 in 1896-7; being an increase of £826. The revenue was derived as follows:—

	1898.		1897.
Gas-rentals, &c., within the city	£386,952	..	£386,797
Do. beyond the city	83,029	..	78,053
Coke	39,668	..	37,604
Tar	24,409	..	31,650
Ammonia water	19,071	..	18,448
Sundry receipts	513	..	264
	£553,642	..	£552,816

The amount paid for coal, cannel, and oil, including the cost of unloading, was £221,235. The cost of this material per ton carbonized was 10s. 10·38d., against 11s. 5·27d. for the previous year—a gain to the Committee of 6·89d. per ton, which on the total carbonization of 407,236 tons amounts to £11,691. The whole of the works and plant have been kept in a state of thorough repair out of revenue.

The gross profit on the year's working was £112,796 18s. 10d. The sum of £34,193 11s. 4d. was paid for interest; and £22,435 8s. 3d. has been placed to the sinking fund (as required by the Acts of Parliament under which the money is borrowed). The net profit, therefore, amounted to £56,167 19s. 3d. Of this amount £50,700 was paid over to the city fund, and the balance, £5467 19s. 3d., has been placed to the suspense account, on account of the outlay on carburetted water-gas plant to date.

The expenditure on capital and renewals accounts was as follows:—

	Capital.		Renewals.
Gaythorn	£11,184 8 4 ..		£8,164 10 11
Rochdale Road	9,118 0 10 ..		9,809 12 7
Bradford Road	34,078 5 1 ..		1,528 7 6
Droylsden	655 18 0 ..		117 17 6
Street-mains	20,170 15 6 ..		9,873 5 8
Service-pipes	9,639 3 8 ..		3,213 1 3
Meters	37,008 13 4 ..		1,197 11 9
Stoves	7,894 18 9 ..		259 12 3
Stoves show-room, Deansgate	54 0 0 ..		—
Oil storage depôt (Mode Wheel)	3,298 12 1 ..		—
Cottage property	1,529 7 3 ..		—
Land and property	849 3 4 ..		—
	£135,481 6 2 ..		£34,163 19 5

The construction of the inclined retort-settings in No. 1 retort-house at the Gaythorn station has been carried out during the year. Half of the retorts are under fire; and the whole are expected to be ready for work by the ensuing winter. The coal elevating, conveying, and charging machinery is nearly finished; and the coke-conveying plant is also well in hand. It is anticipated that when this installation of inclined retorts, with its accompanying plant and machinery, is completed and fully at work, the economical and satisfactory manufacture of gas will be greatly promoted.

The retort-settings in the "C" retort-house at the Rochdale Road station have been reconstructed on the regenerator system, and are now fully at work. The conversion of the "A" retort-house into a meter and governor house and workshops, as decided upon by the Committee, is being proceeded with.

During the past year, the carburetted water-gas plant at the Bradford Road station was completed and put to work, and has worked satisfactorily. Two cargoes of oil were received under contract during the year—one on July 26, 1897, by the s.s. *Elbruz*, containing 951,791 gallons, and the other by the s.s. *Kasbeck*, on Feb. 17, 1898, containing 956,129 gallons. The arrangements for berthing the ships and transferring the oil to the tanks were carried out satisfactorily. The use of this oil in the manufacture of gas at the Bradford Road works has greatly reduced the necessity for the purchase of expensive cannels for enriching purposes. There has also been used 5292 tons of coke; and to this extent the accumulation and deterioration in the value of the coke has been prevented. There are eight new purifiers in course of erection. A new boiler-house has been erected, with space for three boilers; and two have been placed therein. The purifiers and boilers will be available for work for the ensuing winter.

The inclined retorts at the Droylsden station were extended during the year, and continue to work satisfactorily; and the experimental purifying plant is also producing good results in sending out gas of exceptional purity and high illuminating power.

The work of keeping the street mains and services in good condition has been steadily kept in view during the year. The large increase in the use of prepayment meters, gas-cookers, and gas-fires has added much to the work of the department; and all applications for supply have been attended to as promptly as possible. A new 30-inch independent main has been laid down for transmission of gas from the Bradford Road to the Rochdale Road works, and thence to be distributed into the various districts; thus ensuring a more regular and abundant supply of gas. The total length of mains now laid is 1,351,308 yards, or 767¾ miles and 68 yards.

The business done at the stoves show-room in Deansgate has been satisfactory, and gives evidence of an increasing demand for gas for cooking and heating purposes. The following is a summary of the year's transactions, as compared with the previous year:—

	1898.		1897.
Number of articles sold	947	..	1218
New cookers and heaters purchased	1454	..	437
Stoves issued on ordinary hire (including new stoves and re-issues)	2312	..	1233
Stoves issued on the hire-purchase system	63	..	34
Stoves cleaned and repaired	874	..	830

Accompanying the report are the accounts and the usual appendices, from which we take the following particulars:—

PROFIT AND LOSS ACCOUNT.

INCOME.

Gas-rental—			
Ordinary meters			£407,459 0 0
Prepayment meters			19,698 1 9
Public lamps			37,350 12 7
Meter-rents (beyond the city)			3,175 16 4
Stove-hire			2,297 14 6
Residual products—			
Coke	£39,668 5 5		
Tar	24,408 15 8		
Ammonia water	19,071 0 11		
		83,148 2 0	
Rents of cottages, &c.		512 7 5	
		£553,641 14 7	

EXPENDITURE.

Cannel and coal (including cost of unloading, &c.)	£221,235 6 4
Retort men's wages	42,942 0 9
Retorts, fire-bricks, &c. (including cost of setting)	12,975 5 2
Repairs and maintenance of works, mains, &c.	61,304 6 11
Renewals of plant, &c.	34,163 19 5
Purifying material and wages	1,638 5 4
Salaries and wages of clerks in Superintendent's office, rental and inquiry offices, and meter inspectors	20,616 3 0
Collectors', receivers', and cashiers' salaries	8,482 17 4
Rents, rates, and taxes	30,951 1 4
Bad debts	452 15 5
Miscellaneous expenses	5,399 8 9
Bateman's defalcation account (less £1000 receivable from guarantee fund)	683 6 0
	£440,844 15 9
Balance	112,796 18 10
	£553,641 14 7
Interest	£34,193 11 4
Sinking funds	22,435 8 3
Balance (net profit on the year's working)	56,167 19 3
	£112,796 18 10

The balance of net profit is applied as follows:—

Amount paid over to the city fund account	£50,700 0 0	
Suspense account in connection with expenditure on carburetted water-gas plant	5,467 19 3	
	£56,167 19 3	

The appendices following the accounts furnish, as usual, statistics as to the progress of the gas undertaking during the year.

The figures in Appendix A—a statement of the lamp and private rental, including meter and stove rents, derived from within and beyond the city—have already been given in the profit and loss account.

Appendix B is a comparative statement of the gas transmitted from the works in the daytime and during the twenty-four hours, for the past two years. Summarized, the figures are as follows:—

	Daytime. Cubic Feet.		Twenty-four Hours. Cubic Feet.
Year ended March 31, 1897.	1,136,285,000	..	4,182,339,000
Do. do. 1898.	1,103,229,000	..	4,153,520,000
Decrease	33,056,000	..	28,819,000

	Cubic Feet.
Quantity of gas transmitted from works	4,153,520,000
Do. measured and accounted for	4,004,971,000
Loss (by condensation and leakage)	148,549,000, or 3·58 per cent.

In Appendix C, particulars are given as to the results of the working from June 24, 1880, to March 31, 1898. The table contains statistics as to the number of tons of coal carbonized, the total make of gas, the percentage unaccounted for, the yield per ton of coal, the illuminating power of the gas, the quantity of residual products, &c., for each year in the above-mentioned period. The particulars for the past financial year are as follows: Coal and cannel carbonized, 407,236 tons; gas made, 4,157,796,000 cubic feet; yield per ton of coal carbonized, 10,210 cubic feet; illuminating power, 19·51 candles; make reduced to 20-candle power, 4,055,930,000 cubic feet; make per ton, 20-candle power, 9960 cubic feet; make of coke, 245,749 tons; do. per ton of coal, 12·82 cwt.; make of tar, 25,160 tons; do. per ton of coal, 12·44 gallons; make of ammoniacal liquor (10-oz. strength), 10,761,957 gallons; do. per ton of coal, 28·06 gallons.

Appendix D shows the number of stoves on hire and of each size of meter in use during the year in the city and out-townships. At the close of the past financial year, there were 3760 stoves on hire within, and 1428 beyond the city—together, 5188, as compared with 2991 and 1103 (together 4094) at the corresponding date in 1897; so that there was an increase of 1094. The number of meters in use was 112,263 in 1898, and 100,647 in 1897. There was last year a net increase of 11,616 on the number for the preceding year. Of the total number at work on March 31 last, 104,752 were on hire, as compared with 92,447 at the close of the financial year 1896-7. The number of prepayment meters on hire on March 31 last was 22,761—an increase of 8802 on the number at the close of the preceding year.

From Appendix E we learn that the gas-mains laid last year within the city amounted to 30,212 yards, and beyond the city to 16,487 yards

—a total of 46,699 yards, or 26½ miles 59 yards. The mains taken up were 11,611 and 3170 yards respectively—a total of 14,781 yards, or 8¼ miles 261 yards. The total net increase during the year, therefore, was 31,918 yards, or 18 miles 238 yards. The total length of mains laid at March last was 1,351,308 yards, or 767¾ miles 68 yards.

Appendix F consists of a statement showing the amount of gross profit made from the gas undertaking, and the mode of its appropriation, also the amount of borrowed money owing, excess of assets, &c., from 1862 to March 31 last. The figures for the past financial year are as follows: Profit, £112,796; paid over for improvement purposes, £50,700; transfer from contingent fund, £5863; borrowed money owing, £1,058,989; and excess of assets, £1,017,410. The profit of £112,796 is appropriated thus: Interest, £34,193; liquidation of mortgage debt, £22,435—leaving a surplus of £56,168.

The report and accounts came before the City Council at the meeting last Wednesday, when their adoption was moved by the Lord Mayor (Alderman Gibson). Having detailed the chief features of the report, his Lordship remarked that when the Council considered that the price of gas had been reduced to 2s. 3d. per 1000 cubic feet, that they had abolished the charge for meter-rent, and that, notwithstanding that they had a very powerful competitor in the electric light, and an abnormally mild winter, the receipts had been £5151 in excess of those of last year, probably they would not have much to complain of. He pointed also to the saving effected in the matter of carbonizing cannel, and the small amount of leakage, and to the fact that there was an excess of assets over liabilities in respect of the gas undertaking of £1,017,410. These assets included an increase for the present year of £27,000. The Committee had not only put a very respectable sum to the contingent fund, but had set aside £50,000 towards the reduction of the city rates. He trusted the report would be satisfactory to the Council and to the public. Mr. Briggs seconded the motion, and it was carried.

SALFORD CORPORATION GAS SUPPLY.

At the Meeting of the Salford Borough Council last Wednesday, the Gas Committee presented a report which stated that the business of the department continued to steadily increase; the increase for the year ending March 31 last being equal to 3·77 per cent. over the previous year. The coal and cannel carbonized during the year amounted to 129,016 tons; and the quantity of gas made was 1,346,315,000 cubic feet, of an average illuminating power of 19·02 candles—the parliamentary standard being 18 candles within the borough, and 17 candles, as tested, in the out-districts. The cost of coal was rather less than in the previous year; and the working expenses had been considerably less. The market for residuals had shown improved results for sulphate of ammonia; but the markets for coke and tar products had been depressed, and the revenue from these sources had fluctuated accordingly. The works and plant had been maintained in a thoroughly efficient condition. Considerable enlargements had been made in the trunk mains; and an ample supply could now be given to the out-districts. The Committee also reminded the Council that the price of gas had been reduced during the year; the differential rate having been abolished in the borough of Eccles and the districts of Swinton and Pendlebury, and reduced in other districts. The report was adopted. In proposing the acceptance of tenders for the supply of coal and cannel to the amount of 116,800 tons, Mr. Phillips explained that the Council were paying slightly more for the coal than last year, but less than the average advance in prices represented.

BURY CORPORATION GAS SUPPLY.

A Loss of £1606 on the Year's Working.

At the Meeting of the Bury Town Council last Thursday, Mr. Byrom stated that on the year's working of the Gas Department there had been a loss of £1606; but, in view of pending prosecutions arising out of certain alleged irregularities in the department, he declined to give any reasons for this loss. He added that next year's profit from the gas-works was estimated at £3000, with the same price to consumers. The proceedings of the Gas Committee were confirmed. From the annual report of the Gas Manager (Mr. H. Simmonds) it appears that the quantity of gas made during the last year was 319,149,000 cubic feet, while that sold to private consumers amounted to 278,746,750 cubic feet. The gas used for public lighting aggregated 27,700,000 cubic feet; and 6,482,000 cubic feet were used for public works and clocks. The loss through leakage, condensation, &c., was 7,219,150 cubic feet, which is equal to 2·3 per cent., as against 13,060,650 cubic feet, or 4·03 per cent., in the previous twelve months. During the year, the public lamps had been increased from 2126 to 2170; and there were 275 more gas-stoves and 287 grillers in use. The number of prepayment meters fitted is 1060—an increase of 204 on the year.

ROTHERHAM GAS-WORKS CONTRACTS.

At the Meeting of the Rotherham Town Council last Wednesday, the Gas Committee recommended the acceptance of various tenders relating to the extension of the gas-works, and also for coal at prices ranging from 8s. 10d. to 9s. 6d. per ton. Mr. G. Gummer, in moving the adoption of the recommendations, said they contained some important contracts. One was in connection with the present extensions; and the Committee suggested that it should be let to Messrs. Newton, Chambers, and Co.—including purifying plant, exhausters, and scrubbers—at a cost of £11,200. There were also the contracts for the completion of the retort-house and of the additional six beds of retorts to be erected at the scheduled prices of the contract with Messrs. Dempster. Further contracts referred to foundations and the storage of tar and liquor. As to the contracts for coal, he was sorry to say the additional cost to the department would exceed £450 a year; and he hoped the members, when they criticized the working of the department at the end of the financial year, would take this into consideration. With regard to tenders for gas-mains, he alluded to the discussion on the subject in other towns, more particularly Glasgow, as to whether tenders for mains should be let to American firms, whose quotations were considerably below those of English makers. So far as Rotherham was concerned, the price for American pipes would be £1899, as against £2318—the lowest of the English makers. In order that there should be no doubt about the quality of the pipes, he had instructed their Engineer to wire to Glasgow; and the Gas Engineer there had answered that he was quite satisfied with the American pipes. Alderman Gummer asked if the pipes were cast in America or in England by American firms. Mr. Gummer replied that they were cast in America and sent to England. The sample and inquiries would have to be perfectly satisfactory before the order was placed with the firm, who were sending a 4-inch pipe as a sample. Mr. Mason suggested it might be advisable to consider offers of coal at less prices than the Committee had recommended. He had moved in Committee that a tender at 7s. 6d. per ton should be accepted; while nearly the whole of the coal was proposed to be taken at 9s. 6d. He was told that by test the coal they had been using had yielded above 11,000 cubic feet of gas per ton, and that the coal at 7s. 6d. would give more than 10,000 cubic feet per ton. The difference of 2s. in the price more than doubly covered the lower production of gas. These remarks led to considerable discussion, among the speakers being Mr. Hirst, who thought it would be better to refer the whole of the contracts back. He argued that the decision of the Corporation some years ago, when it was made a principle to assist the local collieries, had resulted in the formation of a ring among the local coalowners; and the result had been that they had had to pay much higher prices than if there was open competition. The three top prices of the tenders recommended, he thought, furnished proof of the existence of that ring. Was it, he asked, wise to allow this ring to continue? and were the Corporation to pay through the teeth for it? Mr. F. Mason moved an amendment that a tender at 9s. 5d. per ton should be struck out, and that 1500 tons be purchased from the Company who tendered at 7s. 6d. Mr. Gummer objected to any alteration in the recommendations of the Committee. With the exception of Mr. Mason, there was not a single member who had taken part in the discussion who was present at the meeting of the Committee when the tenders were considered. They should be guided by the commercial value of the coal. Mr. Hickmott said he was of opinion that members of the Council who were in any way interested parties in coal pits should be thrown off the Committee. He asserted there was a determination in Committee that the orders for coal should go somewhere, without considering the quality. Mr. Gummer did not think any member had a right to say that persons being interested parties had made up their minds to send contracts for coal in any direction. Alderman Gummer spoke in favour of free trade in coal, and the Council acting on purely commercial principles. They had never had free trade in coal since he had been a member of the Corporation. He asked if there was not something behind this continual fighting over the coal contracts. Mr. Gummer warmly criticized his father's remarks, which he regarded as an insult to the Committee. He denied that members of the Committee were personally interested in the coal contracts; and rather than face a hint of that sort, he would give up his position as Chairman. The Mayor (Alderman G. Neill) did not think there was any personal imputation. Ultimately Mr. Mason's amendment was defeated; but a further proposal to add to the contracts 1000 tons of coal offered at 7s. 6d. was accepted by ten votes to eight.

DENTON GAS DEPARTMENT.

The Annual Accounts.

The accounts of the Gas Department of the Denton Urban District Council for the year ending the 31st of March last, certified by Messrs. Nairne and Son, have been issued. They show that the gas-rents (less allowances) amounted to £8368; the meter-rents to £144; residuals produced £1714 (coke realizing £950); and the total revenue was £10,344. The manufacture of gas cost £4532, of which £2853 was for coal and £1168 for salaries and wages; distribution came to £698; and management to £779. The total expenditure was £6010; leaving a balance of £4334. Of this sum, interest on loans, annuities, and sinking fund charges for the year absorbed £3487; leaving a balance (net profit) of £847. Appended to the accounts are some particulars in regard to the manufacture of gas for the past financial year, furnished by the Manager (Mr. J. Chadwick Smith). The quantity of coal carbonized was 6569 tons; costing 8s. 8·26d. per ton. The make of gas was 71,625,000 cubic feet, of which 64,284,900 cubic feet were sold—a difference of 7,340,100 cubic feet, or 10·24 per cent. loss. Calculated at per 1000 cubic feet, the cost of gas made was 1s. 3·18d.; and gas sold, 1s. 5·52d. The average selling price being 2s. 7·24d., the gross profit was at the rate of 1s. 1·72d. The annuities, interest, and sinking fund charges work out to 1s. 1d. per 1000 cubic feet of gas sold.

Extensions at the Bangor Gas-Works.—Last Tuesday week, Mr. W. O. E. Meade-King, one of the Local Government Board Inspectors, held an inquiry at Bangor respecting the application by the City Council for powers to borrow £2500 for the erection of a new gas-holder and £300 for a new scrubber-washer at the gas-works. There was no opposition. The Deputy Town Clerk (Mr. J. A. Rodway) stated that the Council proposed to put up a two-lift gasholder in place of the present single-lift holder; and for this purpose £2500 would be required. The present storage capacity at the gas-works was 112,000 cubic feet, which, by the erection of the proposed new holder, would be increased to 183,000 cubic feet. Evidence in respect of this was given by the Sub-Manager (Mr. J. Smith), who also stated with respect to the sum of £500 required for the erection of a new scrubber-washer that this would be capable of purifying a million cubic feet of gas per day. In reply to the Inspector, the Borough Accountant (Mr. E. Smith Owen) stated that the total amount of the Corporation's outstanding loans was £127,350; the assessable value of the borough being £38,327.

LOCAL AUTHORITIES AND THE WORKMEN'S COMPENSATION ACT.

The Question of Insurance.

We have received from the Town Clerk of Stoke-upon-Trent (Mr. J. B. Ashwell) the minutes of proceedings and the resolutions passed at a meeting of representatives of a number of gas-supplying Local Authorities, convened by the Mayor of Stoke (Mr. F. Geen), held at the Westminster Palace Hotel, on the 28th ult. The Lord Mayor of Manchester (the Right Hon. Alderman R. Gibson) presided. After making a few remarks upon the desirability of combination, the Chairman called upon the Mayor of Stoke, who is also the Chairman of the Gas Committee of the Corporation. Mr. Geen explained shortly the objects of the meeting, and said it appeared to him that, under the Act, it was incumbent upon Gas Committees to make provision for claims which were likely to be made, in one of the following ways: (1) To set aside yearly a sum and become their own insurers; (2) to contract with the workmen; (3) to join together and form a mutual insurance fund; (4) to effect an insurance with an Insurance Company. It was then moved: "That we, the representatives of Corporations and Urban District Councils owning their own gas undertakings, having heard the statement of the Mayor of Stoke-upon-Trent, and his proposal for a scheme of mutual insurance against liabilities incurred under the Workmen's Compensation Act, 1897, are of opinion that it would be to the advantage of all such authorities to formulate such a scheme." A general discussion ensued; but no amendment was proposed. The Mayor of Stoke thanked those present for their kind consideration, and replied to all the points raised. He said he considered a premium of 5s. per cent. on the wages of the gas-works workmen and others coming under the Act would be ample; and instead of a differential rate, he suggested that, after providing a sufficient reserve fund, bonuses should be paid to those authorities whose workmen had not received as much out as had been paid in on their account. He further suggested that those Corporations who were not willing to become their own insurers should insure for a period of (say) three or six months, pending the completion of the scheme or otherwise. After some discussion, it was agreed that it would be desirable to include in the scheme "electricity works;" and, by consent, the resolution was altered accordingly. In this form it was unanimously adopted. The following resolutions were then passed: "That, subject to the consent of the authorities represented thereon, a Committee be formed to confer with the Mayor and Town Clerk of Stoke-upon-Trent for the purpose of formulating the scheme, and that such Committee consist of a representative from each of the following authorities—namely, Stockport, Rochdale, and Macclesfield, with Mr. J. W. Wilson, M.P." "That the Town Clerk of Stoke-upon-Trent be requested to forward copies of the resolutions passed, together with a short report, to the Chairman of the Gas Committee of each authority." A cordial vote of thanks was then unanimously accorded to the Mayor of Stoke-upon-Trent for his services; and the proceedings closed with a similar compliment to the Chairman.

Last Wednesday the Gas Committee recommended the Rotherham Town Council to insure under the Workmen's Compensation Act, and advised that the matter be left in the hands of the Chairman and Secretary of the department to deal with. In submitting the minutes, Mr. G. Gummer (the Chairman) remarked that there had been some discussion in Committee on the question of insuring the department against any probable loss through accident; and he had also attended a meeting in London, presided over by the Lord Mayor of Manchester. The general expression of opinion throughout the gas world was that they ought not to run the risk of any accident. Considering that the rates of insurance had been brought down considerably, and within the reach of gas undertakings generally, they ought to protect themselves by insurance. The Committee therefore recommended that they should insure the men, including the clerks and employees inside and outside the works. The cost would not be great. Assuming they had to pay the highest rates quoted, it would not be more than £50 per year; but they anticipated getting the rate reduced to something like £35 per year. He mentioned this because there was strong opposition in the Committee against insuring at present; the idea being that the rates of insurance would be lower later on. The recommendation was passed.

On the recommendation of the Finance Committee, the Leeds County Council last Wednesday decided to defer for six months the question of insuring against risks under the Workmen's Compensation Act through a company; and meanwhile the Sub-Committee were directed to institute inquiries to see whether it would be legal, and if so, if it would be desirable, to join other Corporations in mutually insuring their own risks. A protest against this course was made by Mr. Lowden, who pointed out that the Gas Committee were the largest employers of labour in the Council; and yet for six months they were practically uninsured. For that period the liability for any accidents that might occur was thrust upon them; and he wished to disclaim any responsibility on the part of the Gas Committee. Another matter of a cognate nature came up for discussion at a later stage of the proceedings. Alderman Cooke, the Chairman of the Water Committee, introduced a resolution, which was supported by Mr. Lowden, and which, in the course of the discussion, was amended until finally it was submitted to the vote in the following form:—"That the Council appoint a Permanent Committee, consisting of the Chairmen of all the labour-employing Committees, to advise, in conjunction with the Committees of the Corporation, on the questions of wages and conditions of labour of the whole of the workmen employed by the Corporation; and further, to deal with any matters arising under the provisions of the Workmen's Compensation Act of 1897." The resolution was lost by about 17 votes to 13.

The uncertainty that surrounds the actual financial liability of all employers of labour under the Workmen's Compensation Act has induced the Vestry of St. Margaret and St. John, Westminster, to convene a conference of all the Local Authorities throughout London to consider the desirability of forming an insurance fund with respect to claims which may be made by various classes of their workmen. Pending the selection of a day for the holding of the conference, it is interesting to note that the Islington Vestry have been early in the field of inquiry, and have already adopted a report from their Parliamentary Committee setting forth the extent to which it is believed the Vestry, in common with others, are liable under the Act. The report states that the Vestry will have to pay compensation for accidents, in accordance with the scale and conditions set out in the first schedule to the Act, to the employees at the Vestry's electric light station. With a view to obtaining information on the subject of the risk, quotations were procured from two Insurance Companies, showing the rates of premium required to be paid to insure against the liability under the Act. In each case the rate per annum was 17s. 6d. per £100 of wages; and in one it covered the whole of the Vestry's employees, with aggregate wages of about £50,000 per annum. The same Company quoted 50s. premium, subject to discounts when the wages exceed £10,000 per annum, for the electricity works' employees only. The London County Council do not intend to take any action under the Act until it is found how cases are decided; and the Islington Vestry have resolved, in view of the high rates of premium quoted to them, to follow their example, and not insure until some experience has been gained of the working of the Act.

THE INSPECTION OF GAS LIQUOR AND OTHER WORKS UNDER THE ALKALI ACTS.

The Sub-Inspectors' Reports.

We complete to-day the notice, commenced last week, of the reports of the Sub-Inspectors under the above-named Act.

Reporting upon the district embracing the South-West of England and South Wales, Dr. Fryer states that the number of separate processes under examination last year was 204, of which 61 were carried on in sulphate of ammonia works and 10 in works for the distillation of tar. Some 663 visits were paid to the various establishments, and 658 chemical tests applied in order to ascertain the quantities of noxious gases escaping into the air. There are 64 works registered where the manufacture of muriate and sulphate of ammonia is carried on; and the total quantity of ammoniacal compounds produced during last year amounted to 8859 tons, calculated as ammonium sulphate. Complaints are occasionally made of nuisance caused in the immediate vicinity of one works hemmed in by dwelling-houses, owing to emission of foul gases. Some of these complaints may, Dr. Fryer says, be well founded; for the steam driven off by the evaporating liquors has an unpleasant odour. The pans are covered in, and some effort is made to condense the steam and pass the residue into a hot flue. Still, it is difficult to prevent a portion of the steam escaping at times into the atmosphere. The Coppée ovens are in use for the coal coked at several of the large iron-works in South Wales, and the volatile matter, excluding water, has been estimated in the coal of the district to be about 17 per cent. As yet nothing has been heard of any serious attempt being made to recover the bye-products. Last year the Chief Inspector commented on this fact; adding: "A change may, however, be effected as, by the introduction of coal-washing machinery, the conditions are now so much modified that the opinion is gaining ground that the air admitted in the Coppée oven may be dispensed with without injury to the resulting coke, in which event plant would soon be added for the recovery of tar and ammonia." Dr. Fryer states that the ingenious form of saturator invented by Mr. C. Stafford Ellery, and described in a previous report, is still giving satisfaction at the Bath Gas-Works.* The top of the saturator is now completely covered in. Mr. Ellery claims that the life of a self-emptying saturator will be longer than that of one subjected to the wear and tear of scooping with wood or metal ladles; that the labour of discharging the saturator is considerably lessened; and that the colour of the salt is better, as it is not brought through the scum which accumulates on the top of the mother liquor. As already mentioned, the total quantity of liquor distilled last year was equivalent to 8859 tons of sulphate of ammonia; the proportion of liquor distilled by the continuous process being 83·2 per cent. The following are the proportions of sulphuretted hydrogen treated by various methods of disposal, in terms of sulphate of ammonia made and per cent. of total make: Claus process, 8·9; oxide of iron purification, 47·6; combustion, 43·5 (mainly from one works). The distillation of tar is carried on at 10 works in Dr. Fryer's district. There has been no alteration in the methods of dealing with the nuisance arising from the gases and vapours escaping from the worm-ends of the condensers and the cooling of the pitch which were described in last year's report.

Dr. Fryer bears testimony to the value of oxygen as a restorative. In several large works in his district, a bottle of compressed oxygen, with reducing-valve and mouthpiece, is now kept in readiness for cases of gaseous poisoning; and he states that several lives have undoubtedly been saved by this valuable restorative. Last year's annual report contained the statement that Mr. William Windus employed compressed oxygen at the Netham Chemical Works, Bristol, as a restorative as early as Oct. 25, 1893. "This, however," says Dr. Fryer, "does not appear to have been the first instance of the use of this excellent remedy for gaseous poisoning; and though Mr. Windus independently discovered the property of oxygen as a resuscitant, he was unaware of the earlier experiments carried on by Mr. Douglas Herman. Some years previously, Mr. Herman had considered this matter; and in April, 1888, he provided an oxygen bottle for use in Messrs. Pilkington's Glass Works at St. Helens. Mr. Herman found it useful on several occasions; and on the 11th and 12th of October, 1893, he applied this remedy in a serious case. Great credit is due to Mr. Herman, who is not only the pioneer in the actual use of oxygen as a restorative, but has been so successful in making a practical use of his discovery."

The separate processes under supervision in the works in Mr. F. Napier Sutton's district, embracing the eastern and south-eastern counties, number 260, of which 76 are connected with the manufacture of sulphate of ammonia, and 19 with the treatment of gas liquor and the distillation of tar. Of the 76 works in which there is plant for the manufacture of sulphate of ammonia, it has not been worked in three. The chief source of the ammoniacal liquor treated is the distillation of coal for gas manufacture. A small portion, however, is derived from the carbonization of bones for animal charcoal manufacture, which produces

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* See "JOURNAL," Vol. LXV., p. 1360.

a very rich liquor. The products consist mainly of sulphate of ammonia; but carbonate and nitrate of ammonia, liquid (refined), and anhydrous ammonia are also made. The total quantity of ammoniacal compounds produced during the past year amounted to 44,141 tons, calculated in terms of sulphate of ammonia. This is an increase of 948 tons on the amount produced in the previous year. Mr. Sutton says the latter figure bears no relation to the increased production of gas made in the district, which has been great; but proportionately less coal has been carbonized owing to the extended use of carburetted water gas. Continued pressure was again brought to bear last year upon the larger works at which the foul gases evolved in the distillation of gas liquor have hitherto been burnt; and some important changes in the method of disposal have resulted or are in course of being carried out.

Reference is made at some length to the proceedings taken against the Commercial Gas Company, which were noticed when dealing with the report of the Chief Inspector. It may be remembered that the case was adjourned for four months, to enable the Company to carry out the completion of the acid works to the satisfaction of the Department; a pledge being given to the Court that the limestone tower for the neutralization of the sulphuretted hydrogen kiln gases would be completed and put in action forthwith. The limestone scrubber was put into use four days later, and has since been continuously in use. It consists of a wooden structure made of 1½-inch tongued and grooved boards, 5 ft. 6 in. square and 21 feet high. Layers of Derbyshire limestone, in good-sized pieces, are supported on five stout wooden gratings; the layers of stone being some 9 inches deep. Manholes for re-charging the trays with fresh stone as this wastes away are provided above each tray. A tumbling-box for flushing with water is fixed inside the scrubber at the top, at which point the neutralized gases leave the apparatus for the draughting chimney. The inlet and outlet pipes are of cast iron; but lead pipes would perhaps be better, for though the acid gases have much less action on cast iron than on wrought iron, some action does occur. The sulphurous acid gases leave the furnace at a very high temperature, and are led by a 9-inch cast-iron pipe to the base of the scrubber. The heat of the gases very rapidly falls by radiation; and in the instance under notice they are quite cold at a distance of 35 feet from the furnace. The acid plant erected at these works was completed and started in November last. The sulphuretted hydrogen will in future be utilized as a source of sulphur for acid manufacture; but the limestone scrubber will be retained in readiness for use again should it be required by reason of temporary stoppage of the plant for repairs.

Mr. Sutton gives the following average figures, obtained from several series of tests, as showing the results accomplished by the use of the scrubber above referred to: Acidity of furnace gases entering the scrubber, 41·40 grains of sulphur trioxide per cubic foot; exit gases from scrubber after neutralization, 0·81 grain; percentage of acid condensed, 98·05. On one occasion, when the sulphate plant was in very full work, and the quantity of gas passing to the kiln was large, the following figures were obtained: Inlet, 61·85 grains; exit gases from scrubber, 0·8 grain; condensation, 98·71 per cent. Mr. Sutton says: "The application of this somewhat novel method for the treatment of the foul gases from sulphate works has thus proved successful, and it has met with the approval of several gas engineers who had under consideration the adoption of other means for the treatment of the foul gases in place of the combustion method *per se* which had been condemned. Limestone scrubbers are now in course of erection at three works at which the gases have in the past been burnt and discharged into the air. . . . Should this neutralization method by these further trials continue to prove an easy and cheap way of getting rid of the troublesome and noxious gases, considerable extension of it may be anticipated in the future, for it is especially applicable to the larger-sized works at which the quantity of sulphuretted hydrogen is too great for economic treatment by oxide purification, and where other approved methods are impracticable, or are thought by the management to be undesirable."

The proportion of liquor distilled by the continuous process in Mr. Sutton's district is 98 per cent. The sulphuretted hydrogen is treated by the following methods: Passed to vitriol chambers, 62·1 per cent.; by Claus process, 13 per cent.; by combustion, 11·2 per cent.; by oxide purification, 7·6 per cent.; by neutralization of the sulphur dioxide (combustion) on being passed to the hydraulic main, 6·1 per cent.

The Claus sulphur-recovery process was used throughout the past year at nine works, and twelve sets of plant exist, though only eleven were employed. Two of these came into use during the past year; and the proportion of gas now treated by this method has increased. All the plants are provided with small limestone towers and oxide purifiers to deal with the sulphur dioxide and sulphuretted hydrogen, which invariably pass away in more or less quantity from the sulphur-depositing chambers. The quantity and proportion of these gases vary considerably according to the way in which the air supply to the kiln is regulated. At some of the works, a careful balance of reaction is aimed at; while at another, preference is given to keeping down the formation of acid compounds to the lowest point. But in most cases a slight excess of air is used in order to maintain the heat of the kiln high, and prevent blockage at that point by solidification of sulphur, and also to guard against overtaxing the terminal catch purifiers.

Oxide purification is in use for the treatment of the foul gases at 43 works; the percentage given above showing a reduction on that of the year 1896 although the number of works using the method is greater. Treatment by oxide is chiefly used at the smaller works, and the production of sulphate at these has not increased so rapidly or in the same proportion as at many of the larger works. At one works, a duplicate purifier has been provided, together with one of Walker's automatic change-valves for the revivification of the oxide *in situ* by chimney draught. Where similar automatic change-valves with chimney connection have been introduced, considerable benefit in prolonging the life of the purifiers has resulted, and their use is accompanied with a minimum of trouble; and mistakes in connection between inlet gases, purifiers, and chimney are rendered impossible. Revivification *in situ* is practised by more primitive means, but with good results, at several other works; but Mr. Sutton says the practice is not so general as it should be.

The use of the hydraulic main for the disposal of the saturator gases with subsequent absorption in the coal-gas purifiers, is practised at three works. This method was used during the past year at one works at which the gases had formerly been burnt in the retort-house flue. The addition of the saturator gases to the crude coal gas had naturally a considerable effect upon both the lime and oxide purifiers; and the quantity of coal gas passed through each box before these became foul showed considerable diminution. Mr. Sutton states that the present method is only tentative, and it will probably give place to combustion and the use of the limestone tower. The quantity of saturator gases passed to the hydraulic mains, together with that treated by neutralization, amounts to 6·1 per cent. of the total required to be treated in the district.

The balance of 11·2 per cent. of saturator gases is disposed of by the primitive and unsatisfactory method of combustion in special fires and retort and boiler flues, and is in use at 13 works. Mr. Sutton regards it as very satisfactory to find both the number of works and the proportion of gas thus dealt with showing such marked diminution year by year. The reduction of the percentage figure to the extent of 6 per cent. in one year is a very long step in the right direction. Pledges have been given, in the case of several of the larger works, that combustion *per se* will be finally abandoned for more approved methods during this year.

Gas tar is distilled at 16 works in the district, and for this purpose 113 stills of various types and capacity are employed. The largest number in use in any one establishment is 48; while at several of the smallest works from one to three stills only exist. The quantities of tar dealt with daily by each still vary from 2000 gallons in the smallest intermittent pot stills to 24,000 gallons per day treated by the patent continuous still. The distillation of tar was given up during last year at the bye-product works of a provincial gas company at which the tar produced at the company's works was distilled. Mr. Sutton states that this tar was notoriously difficult of distillation, owing to its exceedingly carbonaceous character and the quantity of naphthalene contained in it; and it was a matter of wonder to those who knew its nature by experience how it could be distilled at all by itself. The pitch from the tar latterly became quite unsaleable. It has now been arranged for the tar to be taken by a private firm of distillers, who, by mixing it with other tars at their disposal, will have no difficulty in its treatment.

The permanent gases evolved at the worm ends of the tar-stills continue to be treated as hitherto. In every case except one they are passed to the still or boiler fires; the exception being a set of six stills the gases from which are passed through a washer, and then absorbed in oxide of iron. The draughting appliances and methods of final disposal of the gases are generally satisfactory. Some trouble has been experienced at one of the larger works from the destructive action of the gases on the exhaust engine used for draughting them. It has frequently required repairs, and recently the fan had to be entirely renewed. However, since the use of small water-seals close to the point of entry of the gases to the fires, no case of back-firing has occurred.

It only remains now to notice the report of Mr. W. S. Curphey with reference to Scotland. The number of processes under inspection last year was 204, of which 65 related to the manufacture of sulphate of ammonia, and 44 to the distillation of tar. The quantity of sulphate made was 68,521 tons, as compared with 67,243 tons in 1896. The total production was from the following sources: Shale-works, 37,153 tons; iron-works, 17,379 tons; gas liquor works, 13,989 tons. In the course of the year, 428 visits were paid, and 298 examinations made of the gases passing into the air. In several works improvements were made for the more efficient treatment of the noxious gases given off during manufacturing operations. New or enlarged oxide of iron purifiers were provided in five works; and in one, additional cooling appliances were erected for condensing the accompanying steam before the waste gases are led to the purifier. The number of works in which tar was distilled was 44—an increase of one over 1896. One was started for treating tar from gas-works. The chief feature of interest, as regards these works, was the putting into operation, for the first time in Scotland, of Mr. F. Lennard's continuous system of tar distillation, which has been in use in England for some time, and also on the Continent. This system was described in the "JOURNAL" for Sept. 25, 1894 (p. 604); and Mr. Curphey remarks in regard to it that for large works it presents advantages, among which are a reduction in the possibilities of the escape of noxious gases and vapours, and a greatly lessened danger from fire—a most important consideration in works of this character. For these reasons, its adoption is, he says, of general benefit, apart from the question of reduced cost in manufacture. The Chief Inspector under the Act (Mr. R. Forbes Carpenter) refers to it in commendatory language in his report on Scotland. He says it has been in operation far too short a time to enable those who have introduced it into that part of the United Kingdom to speak with certainty as to its merits from the financial point of view. There is no doubt, however, as to its success technologically; and the perfect control the system gives over the whole series of operations ensures a minimum of escape of noxious and acrid vapours. He adds that the apparatus is so complete a revolution in design that hesitation and caution in its adoption are quite natural. He points out, however, that with it there is much less tar in operation at any given time; so that the liability to the serious consequences which follow on accidents must be lessened in their intensity.

This notice of Mr. Forbes Carpenter's report must not close without mention of his reference to the experiments on fertilizers inaugurated in 1896 by Lord Roseberry on his estate at Dalmeny, in which the County Analyst for Midlothian (Mr. J. Hunter) has taken so prominent a part. Particulars of these experiments appeared in the "JOURNAL" for Feb. 1 last (p. 229). They have attracted very wide notice, in England as well as in Scotland. Many of them were directed, both in 1896 and in 1897, to the comparison of the relative values of sulphate of ammonia and nitrate of soda, especially when used in conjunction with other fertilizers, and with the advantage of the knowledge that has of late years been acquired from the study of soils and of the process of nitrification accomplished by the agency of bacteria. The results on the experimental duplicated plots show that, for hay, potatoes, and turnips, sulphate of ammonia established its superiority over its rival both in the weight and the quality of crop obtained. In oats, however, the difference was not marked; but here the experiments were not strictly comparable, owing to the operation of disturbing causes. Mr. Carpenter says the value to the whole country of these patient and complete experiments, which continue the classic researches at Rothamsted of Sir J. Lawes and Dr. Gilbert, is undoubted.

METROPOLIS GAS SUPPLY.

Dr. A. W. Williamson's Quarterly Report.

The following is an extract from the report of Dr. A. W. Williamson, F.R.S., the Chief Gas Examiner for the Metropolis, on the quality of the gas supplied to London during the quarter ended the 30th ult.:—

Illuminating Power (*Candles*).

	Max.	Min.	Aver.
The Gaslight and Coke Company—			
Fenchurch Street, E.C.	17·0	16·3	16·6
Kinghorn Street, Cloth Fair	17·1	16·2	16·5
Dorset Buildings, E.C.	17·1	16·2	16·6
Millbank Street, S.W.	17·3	16·2	16·6
Ladbroke Grove, W.	16·8	16·3	16·4
Vincent Terrace, N.	17·5	16·0	16·4
Carlyle Square, Chelsea	16·6	16·0	16·2
Camden Street, N.W.	16·9	16·0	16·4
Graham Road, Dalston	17·2	16·2	16·6
Kingsland Road, E.	17·6	16·0	16·7
Spring Gardens, Charing Cross	16·9	16·0	16·3
Vinery Villas, St. John's Wood	16·6	15·8	16·1
Lambeth Road, S.E.	16·7	16·0	16·1
Hornsey Road, N.	17·4	16·0	16·4
George Street, Hampstead	17·5	16·0	16·6
Commercial Gas Company—			
Wellclose Square, E.	16·7	16·0	16·2
Parnell Road, Old Ford	17·6	16·0	16·4
South Metropolitan Gas Company—			
Hill Street, Peckham	17·5	16·0	16·8
Bedford Road, Clapham	17·3	16·0	16·6
Stoney Lane, Tooley Street	17·7	16·0	16·4
Lewisham Road, S.E.	16·9	16·0	16·2
Blackfriars Road, S.E.	17·3	16·0	16·5
Burrage Road, S.E.	16·8	16·0	16·4

It appears from these results that the average illuminating power of the gas has been higher than the parliamentary standard at all the testing-stations.

Sulphur (*Grains per* 100 *Cubic Feet of Gas*).

	Max.	Min.	Aver.
The Gaslight and Coke Company—			
Fenchurch Street	13·3	9·0	11·1
Kinghorn Street	14·0	8·9	11·3
Dorset Buildings	13·1	7·8	10·6
Millbank Street	10·6	6·9	9·0
Ladbroke Grove	12·3	8·6	10·2
Vincent Terrace	17·9	11·3	14·1
Carlyle Square	18·8	7·0	10·6
Camden Street	14·1	10·7	12·1
Graham Road	11·5	6·7	9·1
Kingsland Road	14·3	8·3	10·6
Spring Gardens	15·8	8·4	11·4
Vinery Villas	13·8	10·2	11·8
Lambeth Road	13·4	6·1	9·1
Hornsey Road	16·5	8·3	11·8
George Street	15·1	9·8	12·5
Commercial Gas Company—			
Wellclose Square	10·2	6·5	8·3
Parnell Road	13·3	3·9	7·1
South Metropolitan Gas Company—			
Hill Street	13·7	6·7	9·8
Bedford Road	13·0	5·9	10·8
Stoney Lane	22·6	7·7	11·4
Lewisham Road	13·4	8·3	10·8
Blackfriars Road	19·2	6·1	10·1
Burrage Road	12·5	8·8	10·4

The average amount of sulphur present in the gas at all the testing-stations has been considerably less than the quantity permitted. Sulphuretted hydrogen has not been present in the gas at any of the stations.

SALES OF STOCKS AND SHARES.

Mr. Alfred Richards conducted a very satisfactory sale of stocks and shares at the Mart, Tokenhouse Yard, on Monday last week. There was a good attendance, and the competition was decidedly keen. The first lots consisted of a new issue of ordinary stock of the Guildford Gas Company, £5000 of which was offered. It ranked for a standard dividend of 5 per cent. per annum, subject to the sliding-scale. The average price realized was £120 2s. 7d. per £100 of stock; returning the investor £4 3s. 3d. per cent. The total of the sale was £6006 10s. The next lots were a new issue, by order of the Directors, of £10 shares in the Southend Gas Company. The average price realized was £18 5s. 8d. per share; yielding the investor £4 2s. 1d. per cent. The sale produced £15,543 15s. Some shares in the Dorking Gas Company were next offered. The £25 "A" and "B" shares (10 per cent.) fetched an average of £56 12s. 7d.; returning £4 8s. 3d. per cent.; while a "C" share (7 per cent.) was sold for £41, yielding £4 5s. 4d. per cent. on the investment. The sale closed with a new issue of £10 shares in the Whitchurch and District Gas Company, Limited; the dividend on similar shares being at the rate of 6 per cent. They fetched £11 5s. each; yielding the investor £5 6s. 8d. per cent. The total realized was £1687 10s.

Among recent sales, the following may be noted: Messrs. Sewell and Barnes sold at Norwich some ordinary shares (£20) of the British Gaslight Company, Limited, at £126 to £127, and £53 10s. to £54, respectively. Last Thursday afternoon, Mr. J. Chambers disposed of £400 of original 10 per cent. stock of the Henley Gas Company, which realized on an average £232 10s. for each £100; £240 of 5 per cent. shares in the same Company were sold at an average of £117 for each £100 lot; and £150 of new 7 per cent. stock fetched £234. On the same occasion a £100 debenture bond in the Henley Water Company was purchased for £105.

ELECTRIC LIGHTING NOTES.

As the result of a report by the Electric Lighting Committee, the Hereford Town Council have decided to proceed with an installation of electric lighting. The Committee have visited various works; and they believe they will be in a position later on to recommend the Council to adopt gas as the motive power for the generating plant.

A report of Mr. Horace L. P. Boot, the Borough Electrical Engineer of Tunbridge Wells, on the second year's working of the electric lighting undertaking shows that a net profit has been made of £1632. He recommends that the profits should go to benefit the undertaking, and not towards a reduction of rates. The question of introducing electric traction into the town is, he added, being mooted; and he can foresee that if such a venture be entered upon, it will provide a very beneficial load to the lighting works in the daytime, when they are practically idle.

Up to the present, the Bedford Corporation have borrowed £49,000 for electric lighting purposes, including buildings, and they have sanction for raising up to £58,650; but this difference is fully exhausted by outstanding liabilities and works in progress. Last Wednesday week, Mr. H. Law, an Inspector of the Local Government Board, held an inquiry in regard to the Corporation's application for sanction to borrow a further sum of £5400 for providing 65 more arc lamps, lighting the market, extending the engine-room, and making numerous additions to the plant. On the 1st inst., a fresh section of the town was lighted for the first time by electricity; about 106 street-lamps being put into regular operation.

The energy with which even the smaller towns are being exploited by the advocates of the electric light is illustrated by the case of Camborne. The District Council of the place received with astonishment a few days ago the information that the Camborne Electric Supply Company intend to apply for a Provisional Order to supply electricity in the district. "I did not know there was such a company in existence," said the Chairman; and everyone else seemed equally ignorant, though one of the members ventured upon the guess that it was a London Company with local representatives. There was a general disposition to give the electric light a hearty welcome, but less unanimity upon the idea of receiving it through a company; some members being of opinion that it could be carried out quite as well by the District Council. In the end the matter was referred to a Committee.

A somewhat singular, and perhaps not unnatural, act of retaliation on the part of the Electric Lighting Companies is proposed as a result of the second reading by the House of Commons of the Bill to confirm the Electric Lighting Provisional Orders granted by the Board of Trade to the Vestries of Marylebone and Bermondsey. The ultimate fate of the Confirmatory Bill, however, has yet to be decided in Committee. The efforts of the Companies have been in no way daunted, since they also intend, if possible, to bring about contemporary competition with the Local Authorities by seeking to avail themselves of the 1st section of the Act, which has so far secured the success of the Vestries. With this object in view, the County of London and Brush Provincial Electric Lighting Company and the Marylebone Electric Supply Company have served notices on the Vestry of Marylebone intimating their intention to apply to the Board of Trade for Provisional Orders for that district. This is not all, since the Metropolitan Electric Supply Company propose to invade Islington, and have given a similar notice to the Vestry of that district. But Bermondsey has been left to the Vestry and the Companies already possessing powers for parts of the parish.

The Luton Town Council decided last Tuesday, by 15 votes to 7, to adopt the electric lighting scheme of Mr. Albion T. Snell, who was authorized to take all necessary steps for completing an installation. The Electric Lighting Committee have made tours of inspection to Brighton, Dewsbury, and Bradford; but their report, as well as that of the expert, has been keenly criticized. Mr. Snell's scheme estimates the demand for private lamps at 6000, and puts the total consumption for the first year at 126,590 units. The estimated revenue on an outlay of £20,000 is £2757, and the cost of maintenance £2796; leaving an estimated deficit on the first year's working of £39. Mr. Snell first included an item of £623 as revenue from motors and heating; but, in deference to strong criticism, he reduced these items to £276, and compensated for this by increasing his estimate for private lamp consumption from £1850 to £2220. During the debate, it was pointed out that the cost of street lighting by the Gas Company in Luton was about £1500, while in Bedford the outlay for gas and electricity was £1000 more. In addition, the Luton Gas Company lighted the streets with great efficiency, and, while charging the Corporation only 2s. 3d. per 1000 cubic feet, made a present to the town of 1,250,000 cubic feet of gas annually. Mr. Snell proposes to light a small street area by electricity; but his estimated cost is £260, against £130, the present cost by gas. The argument of the Chairman of the Electric Lighting Committee that postponement would mean the loss of the order, and that a company were ready and anxious to step in, seemed to turn the majority in favour of adopting the scheme.

The progress of the electric lighting undertaking of the Manchester Corporation is shown by the report of the Electric Lighting Committee for the year ending the 31st of March. The Committee state that the number of consumers at the close of the year was 1981; being an increase of 400 as compared with the previous year. The total number of lamps connected was: Incandescent, 149,176 (of 8-candle power); arc, 1399—as compared with 120,142 incandescent and 1172 arc respectively in 1896-7. There were also 214 motors in use, representing 496-horse power; being an increase on the previous year of 92 motors, equivalent to 279-horse power. The total length of mains now laid is 80,102 yards, or 45 miles 902 yards. The amount of energy measured and accounted for was 3,641,599 units; being 93·11 per cent. of the total generated at the works. The financial results of the year had been satisfactory. The net profit, after defraying all charges for cost of production, &c., providing for renewals, sinking fund, and interest on loans, amounted to £13,522 17s. 4d. On the 30th of September last the price of electric energy was reduced from 6d. to 5d. per unit consumed, and the fixed charge to long-hour consumers was reduced from £9 to £7 per annum per unit of demand. For the purposes of extensions in contemplation, further borrowing powers are necessary; and, in accordance with a resolution of the City Council, application has been made to the Local Government Board for sanction to raise an additional sum of £200,000. The 20th of May, 1897, marked the commencement of arc lighting in the streets, on which

date the electric energy was switched on to the arc lamps in Albert Square, St. Ann's Square, and Piccadilly. In compliance with instructions from the City Council, arc lamps are shortly to be erected in many of the principal thoroughfares of the city.

The Mayor of Nottingham (*Dr.* E. H. Fraser) made an important speech, at the meeting of the City Council yesterday week, regarding the Bill of the General Power Distributing Company, and its bearing upon the electricity supply undertaking of the Corporation. He described the strenuous opposition which had been offered to the passing of the Bill by the Corporation and others, and complained of the want of exact details as to what the Company proposed to do. That the ratepayers of that city, or of any other city, were to be called upon to assist and take a supply from a Company of that description, in order that a large surrounding district might benefit by their expenditure, was, he thought, a proposition that the Council, or any other Council worthy of the name, was bound to fight to the very last penny they possessed. The proposed powers would constitute an intolerable burden upon the ratepayers. Pointing out the ill-effects of competition by undertakings of this kind, he commended to the notice of those who believed in competition the clause which now appeared in the Bill as it had left the House of Lords. Under that clause, the Corporation had the power to take from the Company a supply in bulk. For that supply, both as to quantity and price, they were to pay arbitration terms; but the distribution of the supply and the cost to the consumer remained in the hands of the Council. Therefore, as regarded the great majority of the consumers under the Bill as it now existed, there could be no competition. It was true that there was an exception made for very large consumers—those taking, he thought, 10,000 units; but they were very few in number. The Council possessed an electric supply undertaking of their own; they had expended upon it about £80,000; they had agreed to expend a further £150,000 in works of extension; and in the near future a very large sum of money—probably a quarter of a million or more—would be spent in the provision of electricity in working of the tramways. They could do everything that the Company would undertake to do; and their charges for electricity were lower than the charges scheduled in the Bill. They claimed that the Bill was an intrusion on their just rights; and having regard to the fact that it proposed to do nothing for them but what they could do for themselves, they said that there was no justification for the foisting of the Company upon them. He therefore moved that the Special Committee be instructed to oppose vigorously the Bill in the House of Commons. Sir John Turney seconded the motion, which was unanimously passed.

METROPOLITAN WATER SUPPLY COMMISSION.

Twenty-eighth Day—Monday, July 4.

(*Viscount* Llandaff, *Chairman*, *Sir* G. B. Bruce, M.Inst.C.E., *Major-General* A. de Courcy Scott, R.E., *Rt. Hon.* J. W. Mellor, Q.C., M.P., *Mr.* A. de Bock Porter, C.B., *and Mr.* R. Lewis.)

The sitting took place at the Guildhall, Westminster.

The following Counsel are engaged: Mr. Pope, Q.C., and Mr. Claude Baggallay, Q.C., for the New River Company; Mr. Littler, Q.C., and Mr. Lewis Coward for the Kent Water Company; Mr. Pember, Q.C., for the Lambeth, East London, Grand Junction, and West Middlesex Water Companies; Mr. Rickards for the Chelsea Water Company; Lord R. Cecil for the Hertfordshire County Council; Sir Joseph Leese, Q.C., M.P., for the Kent County Council and Kent Local Authorities; Mr. Balfour Browne, Q.C., and Mr. Freeman, Q.C., for the London County Council; Sir R. Nicholson for the Middlesex County Council; and Mr. Gabriel P. Goldney (Remembrancer) for the Corporation of the City of London. The Southwark and Vauxhall Water Company are represented by Messrs. Bircham and Co.

Mr. *Howard Martin*, Chairman of the Water Committee of the County Borough of Croydon, said the Corporation of Croydon had two sets of water-works—viz., four wells at Surrey Street, Croydon, and one well at Addington; all being in the chalk. The latter well was outside the borough. The Surrey Street wells were constructed under the powers of the Public Health Act; and that at Addington, under a Special Act. The total capital expenditure had been £158,000. The population of the borough at present was 124,000; and the increase was at the rate of about 3000 a year. The Corporation powers of supply extended over a radius of two miles from the Town Hall. A portion of the northern part of the borough, beyond the radius of two miles, was supplied by the Lambeth Company; this being an area which the Statute forbade the Corporation supplying. The Corporation furnished water to 94,000 people; and the Lambeth Water Company, to 30,000. The Corporation were unable now to supply these 30,000; and they were therefore contemplating an extension of works, at a cost of £37,000. One site for the extension—the Waddon—was being investigated by the Local Government Board. He asked to be excused mentioning the locality of the second, as some difficulty was anticipated in connection with it. With the contemplated works, the Corporation would be able to supply the whole of the borough, and meet the increase that was taking place. The two-mile radius was not strictly adhered to, because the Lambeth Company supplied parts of 33 roads within the radius. Croydon had always insisted on being allowed to supply itself; and this was the view still entertained. Further, the Corporation held that the Water Companies supplying London should not be allowed to take any water from the district whence Croydon drew its supply. The water obtained from their district, while enough for Croydon, would not be sufficient if the London Water Companies were allowed to draw upon it; and it would be a mere drop in the bucket of the requirements of London. The Lambeth Company had power to sink wells in Croydon, but had never done so; and whoever purchased the Lambeth Company, or whether the Company remained as it was, Croydon would object to the power being exercised. Croydon would very strongly object to any scheme by which the London County Council should supply them in bulk, because they held it was very desirable that the supply should be in the hands of the Local Sanitary Authority. If matters were left absolutely as at present Croydon would not press for any change; but if any alteration were made, Croydon would ask to be allowed to buy the part of the Lambeth Company's undertaking which was within Croydon. Otherwise, if the Lambeth Company were purchased, more water might be required, and it might be taken from Croydon sources. There had been considerable complaint because one part of the borough was not supplied with as good water as the other. After heavy floods, for instance, the quality of the Lambeth Company's water was not so good as usual. Then Croydon could not make the Company give a constant supply to houses above a certain level, which houses were not at present so supplied. Then some of the mains were laid so shallow that the water froze very easily. The charges of the Corporation averaged 5⅛ per cent. on the rateable value, whereas those of the Lambeth Company averaged 7¾ per cent. In some cases, the Company's charges were 100 per cent. above those of the Corporation. Croydon was strongly opposed to the acquisition of the Metropolitan Water Supply by a single Authority—to any Authority having any jurisdiction there, or enjoying any portion of the supply there. Croydon made a profit on the supply of water, which was applied partly in reduction of the rate, and partly to provide a fund to meet future water expenditure. With the proposed extension, Croydon would be able to give a constant supply where the Lambeth Company did not, and, as Croydon thought, could not give such a supply. On the subject of control, he wished for power to proceed in regard to complaints against the Water Companies as summarily as they could if short weight of bread or coal were given; and also power to take samples of water wherever they liked. On it being pointed out to witness that power to proceed summarily was given under the Act of last year, he said in that case the Act would meet one of his points.

The Chairman remarked that the Local Authorities never seemed to read or trouble about the Acts of Parliament relating to water. Their ignorance of them made one rather shy about recommending any further enactment.

Witness (continuing) said that with regard to streets inside the two-mile radius supplied by the Lambeth Company, the Corporation had a friendly arrangement under which the Company reduced their charges to about those of the Corporation. The agreement, he thought, did not extend to outside the radius.

By Major-General Scott: Sometimes he believed wells in the chalk affected one another, even if a considerable distance apart; sometimes they did not. As a matter of fact, the West Kent wells about a mile from the Croydon wells had not affected the latter; nor had the Croydon wells affected those of the West Kent Company.

Mr. *Salter Whiter*, Chairman of the Croydon Rural District Council, and formerly Chairman of the Public Health Committee, said the Council comprised a number of parishes lying round the borough of Croydon. Of these parishes, Mitcham and Merton were supplied by the Lambeth Company; Wallington and Beddington, by the Sutton District Water Company; and Purley and the southern portion of the district, by the East Surrey Water Company. The total population was 34,000, of which 17,000 were supplied by the Lambeth Company. In 1895, there was considerable difficulty with the frost in districts supplied by the Lambeth Company; some of the houses in Mitcham remaining without proper water supply till the middle of June, 1896. The Council felt that the Local Authorities, particularly the Sanitary Authorities, should have control over the water supply—especially as to taking samples for analysis from the sources, in order to protect the community against contamination, which they feared might come from surface water percolating into the wells. This was a point which the Council wished to emphasize. The Council favoured the purchase, by the Surrey County Council if possible, of the Lambeth Company—the Croydon Rural District Council to have control, both as to mains and water supply, of the portion of the undertaking which passed through their district, through either a Joint Water Board of the Surrey Authorities or the Surrey County Council. His Council were absolutely opposed to the purchase by an outside body of the Company supplying them with water. They would like to have power to inspect the filter-beds, and to refer to the Local Government Board for settlement any complaints they might make as to the mains. They were opposed to any scheme which would include the London County Council, because they objected to being connected with any plan of bringing a water supply from long distances.

Major-General Scott suggested that the Council might find themselves in a difficulty, if they were mistaken in thinking the supply in Surrey was sufficient; but witness, while admitting that the Council had taken no expert advice, adhered to his opinion as to the sufficiency of the supply.

Mr. *T. H. Watney*, Chairman of the Water Supply Committee of the Richmond Town Council, said that up to 1877 Richmond was supplied by the Southwark and Vauxhall Water Company without parliamentary powers; Richmond being beyond the parliamentary limits of the Company. Richmond complained that the charges were high and the supply insufficient; and in 1877 they established water-works for themselves. The cost so far had been £109,714. At present, 25,700 out of a population of 30,000 were supplied by the Corporation. The borough was extended in 1892; and the extension was the portion now supplied by the Southwark and Vauxhall Company, the Corporation having no power of supply there. The Corporation at present only had sufficient water to satisfy 80 per cent. of the total requirements; the other 20 per cent. being purchased from the Southwark and Vauxhall Company under a clause in the Act of 1884, which compelled the Company to supply Richmond with a quantity not exceeding 1 million gallons a day in bulk at a maximum charge of 1s. per 1000 gallons. The Corporation were taking steps to obtain a further supply, which they were advised would enable them to furnish water to the whole of their district. Richmond wanted to be left alone; being satisfied with the clause in the Act of 1884. If interfered with, Richmond would like to extend their power of supply so as to include the whole of the borough—the outside areas of Kew, North Sheen, and Petersham. The Water Committee were able to pay their way on a rate of 11d. in the pound on the rateable value; receiving payment for water used by the Corporation for municipal purposes at the rate of 6d. per 1000 gallons. Of the 11d., 5d. was due to repayment of loan; but by 1910 this would be reduced to 0·85d. Roughly speaking, the yearly receipts were £10,683, and the expenses £10,453; the latter including interest and repayment of loans. Having regard to the payment of the Corporation for water for municipal purposes, there was practically a rate-in-aid of 2d.; but it was fair for the Corporation to pay, because if a Company were supplying

they would have to pay them. No profit was made on the water that was obtained from the Southwark and Vauxhall Company. Richmond wished to have nothing to do with the purchase of this Company. He did not at all complain of the Company, though their water was not so good as that of the Corporation. In the districts of Kew, Petersham, and North Sheen, the charge of the Company was about 1s. 6d. in the pound on the rateable value. He estimated that Richmond could supply the outside district—buying the water at 1s. per 1000 gallons—at 1s. 8d. Richmond strongly objected to having the London County Council over them; they had an indescribable fear of the Council.

Mr. *G. J. Conesthorpe*, Chairman of the Parliamentary Committee of the Kent County Council, said the only Company in which Kent was interested was the Kent Company, with the exception of the Beckenham district, a small part of which was served by the Lambeth Company. The Council did not wish to purchase the Kent Company; but if a transfer of any kind should take place, Kent would certainly wish to be given the portions of the undertakings in which they were interested—both sources of supply and means of distribution. With these powers, Kent could supply themselves for a very long period from the chalk wells. At present 15½ million gallons daily were drawn from the wells; the total quantity available, according to the statement before the Balfour Commission, being 27½ million gallons. The pumping of the 15½ million gallons had considerably depleted private wells, springs, and streams in the county. Kent preferred to be left alone. Until they had need of the surplus, they did not mind London having it; but they objected to the London County Council having any power over them, because their interests must be antagonistic. There were no complaints as to the quantity or quality of the Kent Company's water. He did not know that the charges were higher than those of any other Company except the Lambeth.

Dr. *R. M. H. Randell*, late Chairman of the Beckenham Urban District Council, said the Kent Company supplied 413 acres, and the Lambeth Company 3468 acres of their district. The Council were quite satisfied with the Kent Company's supply, both as to quantity, quality, and price. As to the Lambeth Company, he complained that the water had to be lifted five times before it reached Beckenham, which was the furthest place from the intake; the result being that the price was high, and that the locality was the first to suffer in case of shortness. There had been several failures of supply and breakdowns, and no satisfaction had been obtained from the Company. Moreover, the Lambeth Company gave only an intermittent supply. He admitted, however, that no steps had been taken, before going to the Board of Trade, to obtain a constant supply, as was provided by the Act.

The CHAIRMAN said that it was difficult to remedy the complaint of a body such as this, when they would not avail themselves of statutory powers that had existed for years.

Witness (continuing) stated that Beckenham wished to have Kent water, and were willing to buy the right at present possessed by the Lambeth Company of supplying water in the district. He strongly objected to the London County Council purchasing the Companies and selling water in bulk. His district would then be able to take only what they could get. Kent water also might be taken for the supply of other districts.

Evidence largely supporting the opinions on behalf of Kent already expressed was then given by Lieut.-Colonel *Kidd*, J.P., formerly a member of the Dartford Local Board, and for some years a member of the Dartford Urban District Council; Mr. *A. T. Waring*, a member of the Kent County Council, Chairman of the Dartford Rural District Council, and Vice-Chairman of the Dartford Board of Guardians; Mr. *F. H. Norman*, Clerk to the Bromley Urban District Council; and Mr. *R. G. Mullen*, Clerk to the Bromley Rural District Council. All these districts are entirely supplied by the Kent Company. Mr. Norman mentioned two small matters which he wanted remedied—viz., that they would like the Kent Company to soften the water a little; and that his Council wished for a reduction of the terms on which they were supplied with water for public purposes, the present charge being 10d. per 1000 gallons, which was 1½d. more than was charged to other trade consumers.

The Commission then adjourned.

The twenty-ninth sitting of the Commission was held yesterday, at the Guildhall, Westminster—Viscount Llandaff presiding. Mr. Andrew Johnston, the Chairman of the Essex County Council, gave evidence as to the feeling of the Council regarding the water question. He said they would be willing to agree to the London County Council's Transfer Bills on certain terms. The agreement arrived at was, roughly, that the means of supply and distribution were to be handed over to Essex. He did not think Essex was opposed to purchasing water in bulk from the London County Council, except on the ground that if this were agreed to, they would probably have to pay for their water the average price paid by the rest of London, whereas at present they paid only a little more than half, reckoning at per 1000 gallons.

Explosion at the Rochester Gas-Works.—An unfortunate accident occurred at the Rochester Gas-Works on Monday morning last week, resulting in two men, Alfred Reeves and William Mercer, both about 45 years of age, sustaining burns of a somewhat serious nature. It appears that, on the morning in question, Reeves and Mercer, with other men, were engaged in emptying one of the purifiers of spent oxide of iron. Work was commenced at four o'clock, in order that the purifier might be cleared before the heat of the sun was felt, and all went well until shortly after seven, when the oxide had been practically removed from the end of the box where the unfortunate men were working. A portion of the oxide then became ignited, and an explosion followed. The fire was put out without delay, but it was found that Reeves and Mercer were badly burnt about the face and hands. The injured men were conveyed to St. Bartholomew's Hospital, where they were detained. The other men engaged in emptying the purifier were not hurt in any way, and proceeded with their work after the removal of their unfortunate mates, who in the course of the week made good progress towards recovery.

GAS AND WATER COMPANIES STOCK AND SHARE LIST.

Referred to on p. 92.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
500,000	10	Apl. 15	10½	Alliance & Dublin 10 p. c.	23¾—24½	+½	4 5 9
100,000	10	"	7½	Do. 7 p. c.	16—17	..	4 8 3
300,000	100	July 1	5	Australian 5 p. c. Db.	105—107*	..	4 13 6
200,000	5	May 26	6	Bombay, Ltd.	6—6¼	+½	4 12 4
40,000	5	"	6	Do. New, £4 paid	4½—5	..	4 16 0
300,000	Stk.	Feb. 24	12	Brentford Consolidated	280—285	..	4 4 3
240,000	"	"	9	Do. New	210—220	..	4 1 10
50,000	"	"	5	Do. 5 p. c. Prf.	140—145	..	3 9 0
159,375	"	June 10	4	Do. 4 p. c. Db. Stk.	130—135	..	2 19 3
220,000	Stk.	Mar. 30	11½	Brighton & Hove Orig.	268—273	..	4 4 3
218,820	"	"	8½	Do. A. Ord. Stk.	195—200	..	4 5 0
933,500	Stk.	Feb. 24	5	Bristol, 5 p. c. max.	127—132	..	3 15 9
420,000	20	Ma . 30	11½	British	53—55	—½	4 1 9
50,000	10	Mar. 11	11½	Bromley, Ord. 10 p. c.	25—27	..	4 5 2
75,000	10	"	8½	Do. 7 p. c.	20—22	..	3 17 3
500,000	10	Apl. 29	6	Buenos Ayres (New) Ltd	9—9½	..	6 6 4
98,123	Stk.	June 29	4	Do. 4 p. c. Db. Stk.	98—100*	..	4 0 0
150,000	20	Mar. 11	8½	Cagliari, Ltd.	30½—31½	..	5 4 9
100,000	10	June 10	7	Cape Town & Dis., Ltd.	15—16	..	4 7 6
50,000	50	May 3	6	Do. 6 p. c. 1st Mort.	58—60	..	5 0 0
850,000	Stk.	Apl 15	13½	Commercial Old Stock	315—325	—2½	4 3 1
200,750	"	"	10½	Do. New do.	252—257	+2	4 1 8
200,750	"	June 10	4½	Do. 4½ p. c. Db. dc.	148—153	..	2 18 10
800,000	Stk.	June 10	12	Continental Union, Ltd.	205—210	..	5 14 3
300,000	"	"	9	Do. 7 p. c. Prf.	192—197	+2	4 11 5
51,600	Stk	Feb. 24	14	Croydon A 10 p. c.	310—315	..	4 8 11
168,400	"	"	11	Do. B 7 p. c.	255—265	..	4 3 0
585,000	Stk.	Feb. 24	5½	Crystal Palace Ord. 5 p. c.	125—130	..	4 0 9
60,000	"	"	5	Do. 5 p. c. Prf.	142—145	..	3 9 0
496,090	10	Jan. 27	11	European, Ltd.	23¾—24½	..	4 9 9
364,060	10	"	11	Do. £7 10s. paid	17—18	..	4 11 9
5,922,110	Stk.	Feb. 10	12½	Gaslight & Coke, A, Ord.	295—299	+3	4 5 3
100,000	"	"	4	Do. B, 4 p. c. max.	118—123	..	3 5 1
665,000	"	"	10	Do. C, D, E, 10 p. c. Prf.	308—313	+3	3 3 11
30,000	"	"	5	Do. F, 5 p. c. Prf.	154—158	+3½	3 3 3
60,000	"	"	7½	Do. G, 7½ p. c. do.	230—240	+12½	3 2 6
1,800,000	"	"	7	Do. H, 7 p. c. max.	195—200	..	3 10 0
463,000	"	"	10	Do. J, 10 p. c. Prf.	308—313	+5	3 3 11
476,000	"	"	6	Do. K, 6 p. c. Prf.	184—188	+1½	3 3 10
1,061,150	"	June 10	4	Do. 4 p. c. Db. Stk.	131—133	..	3 0 2
294,850	"	"	4½	Do. 4½ p. c. do.	148—153	..	2 18 10
968,000	"	"	6	Do. 6 p. c. do.	198—203	..	2 19 1
70,000	10	May 12	8	Hongkong & China, Ltd.	13½—14½	..	5 10 4
3,800,000	Stk.	"	10	Imperial Continental	210—215	+3	4 13 0
376,400	100	Feb. 1	4	Do. 4 p. c. Dbs. Red.	98—101	..	3 19 3
473,600	Stk.	Feb. 10	3½	Do. 3½ p. c. Db. Stk.	103—106	..	3 6 0
560,000	100	Apl. 1	5	Met. of Melbourne 5 p. c. Db.	110—112	..	4 9 3
250,000	100	"	4½	" 4½ p. c. Db.	107—109	..	4 3 7
				* Ex div.			

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
75,000	5	June 29	6	Malta & Medn., Ltd.	4½—5½*	..	5 14 3
541,920	20	June 10	5	Monte Video, Ltd.	14—15	..	6 13 4
617,946	Stk.	Feb. 24	9½	Newc'tle & Gateshd Con.	235—240	..	4 1 3
252,355	Stk.	Jan. 3	5½	Do. 5½ p. c. Db. Stk.	115—120	..	2 18 4
150,000	5	May 26	8	Oriental, Ltd.	7½—7¾	—¼	5 8 3
135,000	5	"	8	Do. New, £4 10s. pd.	6¼—6¾	—¼	5 6 8
15,000	5	"	8	Do. do. 1879, £1 pd.	1½—1¾	..	4 11 5
60,000	5	Mar. 11	7	Ottoman, Ltd.	5—5½	..	6 6 2
500,000	100	June 1	6	People's Gas 2nd M. of Chicago Bd.	103—108	..	5 11 1
848,070	10	May 26	6	River Plate Ord.	9—9½	..	6 6 4
250,000	Stk.	June 29	4	Do. 4 p. c. Db. Stk.	96—98*	..	4 1 8
250,000	10	Apl. 29	10	San Paulo, Ltd.	15¼—16¼	+½	6 1 5
135,000	Stk.	Mar. 30	10	Sheffield A.	245—248	..	4 0 8
209,053	"	"	10	Do. B.	245—248	..	4 0 8
447,427	"	"	10	Do. C.	245—248	..	4 0 8
5,531,250	Stk.	Feb. 24	5½	South Metrop., 4 p. c. Ord.	141—144	..	3 12 11
1,460,000	"	Jan. 13	3	Do. 3 p. c. Db. Stk.	101—104	..	2 17 8
60,000	Stk.	Mar. 11	12	Tottenham and A. Edmonton B.	285—295	..	4 1 4
60,000	"	"	9		205—215	..	4 3 9
182,380	10	June 10	7	Tuscan, Ltd.	13—14	..	5 0 0
149,900	10	July 1	5	Do. 5 p. c. Dbs. Red.	100—103*	..	4 17 1
				WATER COMPANIES.			
746,164	Stk.	June 29	10½	Chelsea, Ord.	313—318*	..	3 6 0
150,000	"	"	5	Do. 5 p. c. Prf.	170—175*	..	2 17 2
160,000	"	"	4½	Do. 4½ p. c. Pf. Stk., 1875	148—152*	..	2 19 3
175,785	"	Mar. 30	4½	Do. 4½ p. c. Db. Stk.	157—162	..	2 15 7
1,720,560	Stk.	Apl. 15	8	East London, Ord.	225—230	..	3 9 7
654,740	"	June 29	4½	Do. 4½ p. c. Db. Stk.	157—160*	..	2 16 3
390,000	"	"	3	Do. 3 p. c. Db. Stk.	103—105*	..	2 17 2
700,000	50	June 29	7½	G'd Junct'n, 10 p. c. max.	115—118*	..	3 3 7
310,000	Stk.	Mar. 30	4	Do. 4 p. c. Db. Stk.	140—145	..	2 15 2
708,000	Stk.	Feb. 10	13	Kent	360—365	+2	3 11 2
160,000	"	"	7	Do. New, 7 p. c. max.	213—218	..	3 4 9
1,043,800	100	June 29	10	Lambeth, 10 p. c. max.	298—303*	+3	3 6 0
406,200	100	"	7½	Do. 7½ p. c. max.	225—230*	..	3 5 3
350,000	Stk.	Mar. 30	4	Do. 4 p. c. Db. Stk.	140—145	..	2 15 2
500,000	100	Feb. 10	13	New River, New Shares	432—437	..	2 19 6
1,000,000	Stk.	Jan. 27	4	Do. 4 p. c. Db. Stk.	141—146	..	2 14 10
902,300	Stk.	June 29	6	Southw'k & V'xhall, Ord.	163—168*	..	3 11 5
126,500	100	"	6	Do. do. 7½ p. c. max.	155—160*	+3½	3 15 0
489,200	Stk.	"	5	Do. do. 5 p. c. Prf.	168—172*	..	2 18 2
1,019,585	"	Apl. 15	4	Do. 4 p. c. A Db. Stk.	141—144	..	2 15 7
1,155,066	Stk.	June 10	10	West Middlesex	297—302	+2	3 6 3
200,000	"	"	4½	Do. 4½ p. c. Db. Stk.	162—165	..	2 14 7
200,000	"	Mar. 11	3	Do. 3 p. c. Db. Stk.	104—106	..	2 16 7
				* Ex div.			

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The Glasgow Corporation Gas Committee yesterday opened tenders for between 500,000 and 600,000 tons of splint, cannel, and gas coal, for use in the coming year. They have, of course, not yet decided as to what they will take. An idea of the trend of the market is to be had, however, from the prices which the Paisley Gas Corporation have this week paid for a supply of between 30,000 and 40,000 tons of splint, cannel, and shale. The cost of splint, delivered at the works, is from 9s. 3d. to 9s. 6d. per ton—an advance of from 1s. 9d. to 2s. on last year's prices—and for cannel, there is an advance of from 6d. to 1s. per ton. Those who contracted early this year have been in luck. I do not know what principle (if any) leads to the selection of any particular period of the year for the fixing of gas coal contracts; but reasoning in the abstract, I incline to the view that the spring months are the best, if for no other reason than that gas managers would then get in before the foreign gas and railway contracts were fixed. To delay till summer means that the foreigner gets the choice of the market, and the home manager runs the risk of having prices put up upon him.

At a recent meeting of the Sub-Committee on Finance of the Glasgow Gas Trust, it was reported by the Treasurer (Mr. J. Fleming) that the collection of gas-rents for the financial year ending the 31st of May, reached £441,860, while the total collection for the year 1896-7 amounted to £426,322. There was thus shown to be an increase amounting to £15,538. Mr. Fleming also reported that the revenue derived from the sale of residual products during the year amounted to £117,082, as compared with £114,465 for the preceding twelve months.

The Paisley Gas Commissioners have just settled their contracts for splint and cannel coals and shales. The prices for splints are 9s. 3d. to 9s. 6d. per ton; being an advance of 1s. 9d. to 2s. per ton on last year's figures; while 6d. to 1s. more per ton has been given on cannel.

Of the gas companies who have held their annnal meetings this week, there is none more gratifying than that at Brechin, which is so efficiently managed by Mr. J. B. Terrace. The Company seem to be less troubled by outside interference than was the case two or three years ago, and are probably also less disturbed by internal dissensions. They are consequently doing better business. The following is the account given of the meeting: "A dividend of 27s. 6d. per share was declared. It was agreed that the price of gas should remain as formerly—viz., 4s. 5d. per 1000 cubic feet. Meter-rents, however, were reduced by one-third for the ensuing year. The reduction, it is stated, will cost the Company £60. On the other hand, the reduction of meter-rents is expected to popularize the consumption of gas in single rooms and small houses, where oil is at present in use. As soon as the Company can afford to dispense with the income from meters, it is expected that the rents will be discontinued altogether. There is no change in the rental for gas-stoves in the meantime. There has been an increase in the sale of gas during the past year of over a million cubic feet; and more new mains have been laid and old pipes repaired than in any previous year for a considerable time."

The shareholders of the Galashiels Gaslight Company held their 64th annual meeting on Tuesday, under the chairmanship of Mr. Robert Sanderson. The report of the Directors, of which a summary was given last week, stated that the profit for the year was £2051, and the balance from the previous year £5876, making together £7928. Out of this the Directors proposed to pay a dividend at the rate of 10 per cent., which would require £2100, and to carry forward £5828. The quantity of gas manufactured during the year was 51,396,000 cubic feet; there was lost by leakage, 2,008,529 cubic feet; used in works and offices, 500,000 cubic feet; and sold, 48,887,471 cubic feet. There was a decrease in the quantity of gas sold of 1,933,499 cubic feet, as compared with the previous year. The Directors regretted having to report the death of Mr. J. Pike, who had ably and efficiently discharged the duties of Secretary and Treasurer for upwards of ten years. They had appointed Mr. John Chapman to the post. They also reported, with much regret, the death of an esteemed colleague, Mr. Peter Sanderson, after a very lengthened period of valuable service on the Board. In moving the adoption of the report, the Chairman said that the Directors very much regretted that the consumption of gas had again fallen off, which was due to the trade of the town not having been so prosperous as usual. Still, it was gratifying to them that there was an increase of profit over the amount for the previous twelve months; and this enabled them to sell gas at last year's price—viz., 3s. 4d. per 1000 cubic feet. It had required careful management to effect this. The profit for the previous year was £1941; and for last year, £2051. The falling off in the income had been more than made up by the decrease in expenditure; the former having been £391, and the latter £534. The report was adopted.

At the annual meeting of the Alyth Gaslight Company on Monday, a dividend at the rate of 5 per cent. was declared; and the Manager (Mr. Andrew Robertson) was voted a gratuity of five guineas for his assiduity in the discharge of his duties. The annual meeting of the Crieff Gaslight Company was held on Monday. A dividend at the rate of 5 per cent., and a bonus of 1s. per share, were declared. The shareholders of the Castle-Douglas Gas Company held their annual meeting on Tuesday. A dividend at the rate of 7 per cent.—the same as last year—was declared; and £25 was added to the reserve fund. The Directors expect that the increased consumption of gas for cooking and heating will soon enable them to reduce the price of gas, which is at present 5s. 10d. per 1000 cubic feet for lighting, and 4s. 7d. for cooking and heating purposes. The Stow (Mid-Lothian) Gaslight Company, have paid a dividend at the rate of 5 per cent. for the past year. The Crail (Fifeshire) Gaslight Company had an income last year of £374, and an expenditure of £268; leaving a balance of £106 of profit, out of which a dividend of 5 per cent. has been paid, and £50 has been added to the reserve fund. It is proposed to expend the reserve fund in extending the retort-house, and bringing it up to date. The Coupar Angus Gaslight Company have paid a dividend of 6 per cent.

The annual accounts of the Water Committee of the Glasgow Corporation show a revenue of £211,371, and an expenditure of £155,084. With the balance from former year there is carried forward, after providing for sinking fund, £39,771, though this year there is provided for

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the fund £57,301, as compared with £36,789 in the previous year. With regard to the water-works, the Committee state that, of the 23½ miles of which the new aqueduct consists, there only now remains the Loch Katrine tunnel contract, 1¼ miles long, to complete the whole. This contract will take two years to finish; but the driving of the tunnel will be completed in about two months, when the construction of the basins at the entrance from the Loch will be commenced. The works connected with the new outlet-dam at the lower end of Loch Katrine were let in the autumn of last year; and a considerable amount of work has been done in getting in the foundations. This contract will take about two years. A contract was also made at the beginning of the present year for the forming of the new road on the north side of Loch Katrine, rendered necessary by the submergence of the old road by the raising of the level of the water by the 5 feet to which the Act limits the Council. This work should also be completed in two years. The use of hydraulic power water continues to increase. The number of machines now supplied is 238—being an increase of 85 during the year; while there are applications for 60 others still on the books waiting for the completion of the buildings or machines.

For some time past very grave misgivings have been entertained regarding the purity of the water supplied to the town of Aberdeen. When the present supply was introduced, in 1864, the Corporation adopted the method of carrying the water for the most part in a built brick aqueduct. Since then many houses have been erected near it; and in connection with them such abominations as soil-pipes, cesspools, and ashpits have been constructed. Some, if not many, of these are in too close proximity to the aqueduct; and it not being of the most faultless construction, deleterious matter has percolated into it, and contaminated the water. At a recent inspection, several glaring instances of pollution were discovered. The Town Council made their annual inspection of the water-works on Tuesday. Reference to the state of matters which exists was made by Mr. Bain, the Convener of the Water Committee. It is plain, Mr. Bain said, that it will be necessary to replace the brickwork by cast-iron mains in many places. The Committee are considering the matter. Nothing has been decided; but Mr. Bain spoke as if it might turn out that the whole aqueduct would require to be renewed, the cost of which is estimated at £129,000. The Council have adopted the sensible view that, at all costs, the water supply must be protected from such contamination as has been found to be taking place.

The Dundee Corporation Water Department have closed their financial year satisfactorily. Their revenue amounted to £49,457 (including a balance of £1307 brought forward); and the expenditure was £49,109. There was thus a surplus of £348. The revenue exceeded the estimate by £210; and the expenditure was under the estimate by £26. In the view of the Committee, they could afford to make some concession to traders who take water by meter, a subject which has been much agitated; and they recommended the Town Council that, while the charge should remain at 7d. per 1000 gallons for quantities of less than one million gallons, what was taken more than this quantity should be charged for at the rate of 3½d. per 1000 gallons. The Council last week adopted the recommendation. The domestic rate was fixed at 10d. per pound; and the public rate, at 1d. per pound—both the same as last year.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *July* 9.

Sulphate of Ammonia.—The market has been quiet throughout the week; and actual business done has only been on a limited scale. But, notwithstanding this, prices remain fairly steady. The closing quotations are £9 3s. 9d. to £9 6s. 3d. per ton f.o.b. at the ports. Available supply is small just now; and makers are in no hurry to sell. On the other hand, buyers' requirements are not urgent; and meantime they seem to be waiting a more favourable opportunity for buying. In the forward position, no actual business is reported; and makers' quotations are as last reported. Beckton are, however, now quoting July-September £9 7s. 6d., Beckton terms.

Nitrate of Soda is quiet, but steady, at 7s. 7½d. per cwt. for ordinary quality on spot, and 7s. 10½d. per cwt. for refined.

LONDON, July 9.

Tar Products.—Excepting creosote and carbolic acid, which are in fair demand, all the other tar products are as flat as they well can be. The shipping season for pitch being over, makers are not much concerned as to market movements respecting it; quotations being a little less. Benzols are weaker, and are being unnecessarily decried by interested parties. Anthracene is also neglected; and absurd prices have been accepted for odd parcels of inferior qualities. The present outlook of products is discouraging; and it is difficult to see where improvement can come, unless it arises from the great increase in the production of carburetted water gas in place of coal gas.

The following may be taken as average prices obtaining throughout the United Kingdom: Tar, 11s. to 14s. 6d. Pitch, east coast, 23s. 6d.; west coast, 18s. to 19s. Benzols, 90's, nominal, 10d.; 50's, 10½d. Toluol, 1s. Solvent naphtha, 1s. 2d. Heavy naphtha, 1s. 1d. Crude, 30 per cent., naphtha, 4½d. Creosote, 2½d. Heavy oils, 40s. to 50s., according to gravity. Carbolic acid, 60's, 2s. 1d. Naphthalene, 50s.; salts, 30s.; anthracene, nominal, "A," 4d. to 5d.; "B," 3d. to 3½d.

Sulphate of Ammonia is not quite so strong; and although large sales have been effected, and considerable shipments are being made, the week closes with prices tending slightly less. The following are about the market values: London, Liverpool, and Glasgow, £9 5s.; Leith, £9 3s. 9d.; Hull and North-Eastern ports, £9 2s. 6d.—in all cases less 3½ per cent., and delivered f.o.b., bags included.

COAL TRADE REPORTS.

From Our Own Correspondents

Lancashire Coal Trade.—The settlement of the wages question, which has now practically been arrived at as a result of the conference held in London last week, and which to a considerable extent was anticipated in previous reports, cannot fail to give a steady tone to the coal trade throughout this district; and it will in all probability bring about

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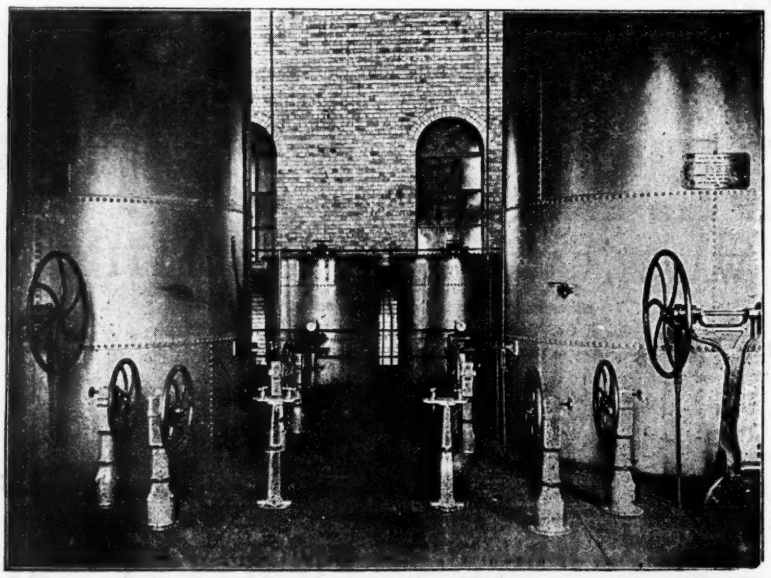

RESULTS PROVE EFFICIENCY.

Working Floor of Generator House. One Quarter Section of Birmingham Plant, Windsor Street Station.
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an early settlement of contracts that are still outstanding. So far there is no change to report on what has previously been stated with regard to the prices that are ruling for gas-coal contracts. These remain at about 6s. 9d. to 7s. 3d. per ton at the pit mouth for common Wigan four-feet; and 7s. 9d. to 8s., for best screened Wigan Arley gas coals. As to general business, this is moving on very steadily; the only quietude being in the better qualities suitable for house-fire purposes. There is, however, no change in list rates, which remain at 10s. to 10s. 6d. per ton for best Wigan Arley; 8s. 6d. to 9s., for Pemberton four-feet and seconds Arley; and 7s. 6d., for common house coal. On contracts with merchants over the next twelve months, 6d. per ton represents the average advance that is being secured, with 9d. realized in some instances. Common round coals continue in active demand for steam, forge, and general manufacturing purposes, with 6s. 9d. to 7s. per ton representing about the minimum figures for good ordinary qualities at the pit. Engine fuel is perhaps not quite so plentiful; and prices are firm at 3s. 3d. to 3s. 6d. per ton at the pit for common, 3s. 9d. to 4s. 3d. for medium, and 4s. 6d. to 5s. for the best qualities. On contracts, a general advance of 6d. per ton has been secured on steam and forge coals, and from 3d. up to 5d. on engine classes of fuel. The shipping trade is moderate, with ordinary steam coal averaging about 8s. 6d. to 8s. 9d. per ton delivered at the Garston Docks, or the High Level, Liverpool.

Northern Coal Trade.—There has been continued, and even increased, activity in the coal trade of the North—partly because of the diversion of trade through the strike in South Wales, and partly because the needs of several of the large consuming centres are growing. In the steam coal trade, the activity is most apparent; and prices have been readily maintained at 13s. per ton f.o.b. for best Northumbrian steam. Second qualities are 12s. 3d. per ton f.o.b.; and steam smalls, 5s. 6d.—the latter quality being very scarce. Gas coals are very firm; and the demands for shipment seem to be enlarging satisfactorily; the lower rates of freight for sea carriage inducing shippers to get forward supplies. For single cargoes, the quotation for gas coals varies from 8s. 9d. to 9s. 3d. per ton f o.b. There is no change in manufacturing coals. Gas coke is steady, with a rather better demand for use at some of the cement works. There is no alteration in price this week.

Scotch Coal Trade.—Coal is scarce, which is more the result of the near approach of the miners' holidays than of market movements. Nearly all sales which are being effected are for delivery in August and onwards. The prices are higher than have ruled recently. Whether the rising tendency will continue, will depend largely upon the prospects of work being resumed in Wales; and, it may be, on the conduct of the men, which at present is not at all unsatisfactory from the coalmasters' point of view. The prices quoted for August delivery are: Main, 9s. per ton f.o.b. Glasgow; ell, 9s. 6d. to 9s. 9d.; and splint, 9s. 6d. The shipments for the week amounted to 253,719 tons—an increase of 16,012 tons upon the preceding week, and of 61,005 tons upon the corresponding week of last year. For the year to date, the total shipments have been 4,552,072 tons—an increase upon the same period of last year of 808,020 tons.

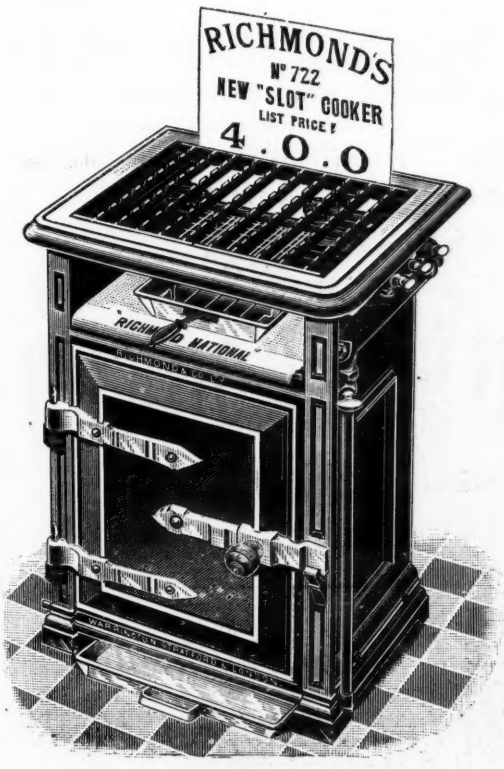
The Eynsham Gas-Works.—Mr. Morgan, the purchaser of the old plant at the Eynsham Gas-Works, has now bought the land whereon the works stood, and has commenced renovating the holders. He intends also to put down new plant on an improved system.

New Joint-Stock Companies.—The Stanford-le-Hope Gas Company, Limited, has been registered with a capital of £5000, in £1 shares, for the purpose of carrying on the business of gas supply at Stanford-le-Hope, Essex. The Carbide-Acetylene Trust, Limited, with a capital of £8100, in £1 shares, is to acquire and turn to account any patents, patent rights, and inventions.

The Success of Incandescent Gas Lighting at Liverpool.—At the meeting of the Lighting Committee of the Liverpool Corporation last Friday, a resolution was passed to the effect that, in view of the success of street lighting by means of incandescent gas-lamps, Mr. C. R. Bellamy, the Gas Superintendent, should be requested to report on the desirableness of the application of the system to the whole of the city.

The Extensions at the Bolton Corporation Gas-Works.—At the meeting of the Bolton Town Council last Wednesday, a letter was submitted from the Local Government Board as to the recent inquiry upon the Corporation's application for sanction to borrow £100,000 for gas-works purposes. The conditions specified in the letter were accepted, and an undertaking was given on the part of the Town Council to repay the loan sanctioned within a period of thirty years from the borrowing thereof. These and other proceedings were confirmed without discussion.

East Surrey Water Company.—The annual general meeting of this Company was held at Redhill on the 25th ult. Sir Myles Fenton, J.P., presiding, in the absence, through indisposition, of the Chairman (Sir F. Bramwell, Bart., F.R.S.). The Directors reported that the profit for the year ending the 25th of March was £15,303. Adding the £1100 brought forward, there was made up a sum of £16,403. Out of this the Directors had placed £900 to the renewal and contingency fund; and they recommended that the dividend of 5 per cent. upon the preference, and one of 6½ per cent. upon the ordinary shares (less income-tax in both cases), should be declared for the year. An interim dividend, however, of 2½ per cent. on the preference, and of 3 per cent. upon the ordinary shares, disposing of £4456, having been paid on the 4th of December last, there would remain 2½ per cent. to be paid upon the preference, and 3½ per cent. upon the ordinary shares. This would absorb £4997, and leave a balance of £1466 to be carried forward. The Chairman, in moving the adoption of the report, said it was extremely satisfactory to the Directors to be able to propose the addition of another ½ per cent. to the dividend. The Company, he was pleased to say, had progressed very rapidly within the past few years; and he saw no reason why it should not progress equally as well in the future. Dr. Clair J. Grece seconded the motion; and it was carried. The dividends recommended were then declared. Mr. F. Budgen, who was Chairman of the Reigate Water Company (now amalgamated with the East Surrey Company), having been elected a Director, thanks were accorded to Sir Myles Fenton, and also, on his suggestion, to the Manager and Secretary (Mr. J. R. Downes) and the officers; and the proceedings closed.



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EIGHTEEN VARIETIES.

Sevenoaks District Council and the Water-Works.—The Sevenoaks District Council decided, at their meeting on the 4th inst., to form themselves into a Committee to consider the advisability of negotiating with the Water Company, with the view of acquiring their property.

The Liverpool Corporation and the Water Supply of Prescot.—The Liverpool Corporation have decided to lay a special main for the supply of water to the particular premises in Prescot in respect of which complaint has been made. This concession may possibly bring to a close the litigation that has been proceeding for some time.

Dudley Corporation and the Gas-Works.—On the proposition of Mr. Cook, who was sure "every member was impressed with the necessity for creating a source of revenue independently of the rates," the Dudley Town Council last Tuesday appointed a Special Committee to consider the possibility of acquiring the gas-works.

Reductions in Price—The West Bromwich Town Council last Wednesday adopted a recommendation of the Gas Committee to lower the price of gas for the current quarter by 1d. per 1000 cubic feet. It was mentioned that this represented a reduction in the profits to the extent of £985. The Denton Urban District Council have decided to make a further reduction of 2d. per 1000 cubic feet in the price of gas; making the charge 2s. 2d. to 2s. 7d. The Stockport Corporation have decided to make a reduction in the charge for gas. The prices to consumers outside the borough will be reduced 1d. per 1000 cubic feet—viz., from 2s. 10d. to 2s. 9d.; and instead of the discount of 2½ per cent. allowed for prompt payment both within and outside the borough, there will be a reduction of 2d. per 1000 cubic feet.

A Troublesome Reservoir at Morley.—The Morley Town Council have encountered a good deal of difficulty in the way of leakage with the service reservoir which they constructed at Bruntcliffe some three or four years ago. A month since the reservoir contained 10 ft. 10 in. of water; but at last week's meeting of the Council, it was reported that, although no water at all had been drawn off for the public supply, the depth had been reduced to 3 ft. 1½ in. According to a letter from Mr. C. Gott, engineer, of Bradford, the puddle lining had given way; but, in his opinion, there would be no difficulty in making the reservoir water-tight when the ground became firm and solid. Mr. S. Rhodes reminded the Council that, before the reservoir was constructed, he called attention to the unsuitableness of the site owing to colliery workings underneath. Some of the coal had already been won; but since the reservoir was built, the Council had received notice from the colliery owner of his intention to work other seams. They had only just repaired the reservoir after discovering one leakage; and rather than continue incurring expense in repairs, he moved that the Water Committee be instructed to make inquiries with a view to securing another site for a reservoir. The Mayor (Mr. C. Scarth), in seconding the motion, said that, if the Council were wise, they would admit that they had made a gigantic mistake, and would take immediate steps to put the town in a better position with regard to the water supply. The motion was defeated. It was, however, resolved that an expert should be consulted and requested to report as to the best course to take with regard to the matter.

Proposed Gas-Works Extensions at Evesham.—At a meeting of the Gas Committee of the Evesham Town Council last week, the Gas Engineer (Mr. P. H. Fletcher) presented a report on the condition of the gas-works, and of the extensions that would be necessary in the near future if the consumption of gas continued to increase. He estimated that it would cost £2270 to carry out the whole of the improvements and extensions required. The consideration of the matter was deferred.

Cost of the Newport (Isle of Wight) Water-Works.—Acting on the advice of Mr. Baldwin Latham, the Newport (Isle of Wight) Town Council have decided to ask the sanction of the Local Government Board to the borrowing of a further sum of £8300 for their new water-works. The sum previously sanctioned was £12,000, and the actual expenditure has so far been £14,000. It is estimated that, when this money is spent, there will be a debt on the works amounting to £32,000, which represents an annual charge to the ratepayers of £2376.

The Effect of the War on the Finances of the Seville Water-Works Company.—The annual meeting of this Company was held on the 1st inst.; Mr. D. Evans presiding. The Secretary (Mr. J. M. Hamilton) having read the notice calling the meeting, the Chairman moved the adoption of the report and accounts. These showed that the income amounted to £28,536. After deducting working expenses, debenture interest, exchange differences, &c., the net profit was £10,106, as compared with £11,546 in the previous year. Adding the unappropriated profit brought forward, and charging the contribution to the sinking fund (£681), the sum standing to the credit of the profit and loss account was £9938. The Directors recommended that £271 be added to the reserve fund, and that the balance of £9667 be carried forward. The adverse exchange which prevailed throughout the year, due to the troubles in Cuba, seriously affected remittances. The declaration of war by the United States raised the rate of exchange to such a point (about 45 pesetas to the pound sterling) that ordinary business transactions were suspended, and the utmost caution had to be used in dealing with the Company's profits. As it was impossible at the present time to raise further capital except at a great sacrifice, the Directors had thought it right temporarily to use the profits for the purpose of paying the contractor for a new foot-bridge over the River Guadalquiver the moiety for which the Company were primarily responsible—viz., 156,620.63 pesetas. The Chairman, in moving the adoption of the report, remarked that it fully explained the position of the Company, and there was very little he could add. The amount of money received in pesetas showed that the business was progressing satisfactorily. The great misfortune was that some time since the rate of exchange with Spain advanced to such a point that it naturally interfered with the Company's remittances, and consequently with their means of paying a dividend. At present the debenture interest absorbed a much larger amount than it ought to do under ordinary circumstances; and, from one cause and another, the Directors thought it prudent not to deal with any of the funds, although they regretted extremely that many of the shareholders should be inconvenienced by not having the money which they, as a matter of course, expected to receive from their investment. Mr. Cowley Lambert seconded the motion, which was agreed to.

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With removable Enamelled Fittings.

Inside Linings can be had Enamelled in a variety of shades.

WRITE FOR OUR NEW SEASON'S LIST.

Explosion of Acetylene Gas.—According to a telegram received through Reuter's Agency, an explosion of acetylene gas occurred last Saturday morning at the metal-works of Messrs. Goliasch and Co., in the Linienstrasse, Berlin. A foreman was killed on the spot, and another man was slightly injured.

The Teignmouth Gas-Works and the Coal Bill.—One of the periodical discussions over the financial difficulties of the gas-works took place at the meeting of the Teignmouth District Council last Tuesday. In the first place, the Finance Committee reported that the Local Government Board refused to sanction an arrangement which it was proposed to make with a bank for the immediate discharge of the liabilities on gas-works account. On the top of this came a letter from the executors of the late Mr. Walker, the contractor for the supply of coal, requesting payment of the sum of £839 owing by the Council. Mr. Jarvis moved that the bill be paid immediately, and expressed the opinion that they would get a writ if they did not do it. Mr. England said that might be so, but they were all anxious to know how the money was to be paid. Mr. Denny suggested that if they had the electric light they would have a paying concern; while Mr. Godfrey told his fellow-members that because of this debt they were paying 10s. 6d. a ton for coal which they might get elsewhere for 6s. or 7s. The Chairman appealed to Mr. Jarvis to explain where the money was to come from to pay the bill; and Mr. Jarvis replied that it was not his place to do that. Thereupon the Chairman ruled the motion out of order.

Parochial Maintenance of Strikers.—The "Western Mail" last Friday contained a letter from a correspondent calling attention to the fact that the present strike in the coal trade has introduced what he calls a "new tyranny" which he thinks is one likely to have far-reaching and disastrous consequences—namely, the maintenance of strikers out of the parochial rates. He says: "Our poor-laws have been passed for the benefit of two classes of persons—those who cannot work, and those who cannot find work. But we are now witnessing their use for an entirely new purpose—that of backing up a side in a labour dispute; for the colliers can neither say that they cannot work nor that they cannot obtain work, but only that they cannot get satisfactory pay for their work. Many of us are in precisely the same position; but, so far, the colliers are the only people who force the ratepayers to keep them, willy-nilly, till they get such terms as will satisfy them. By this practice we are allowing a new principle—the right of a section of the community to tax all ratepayers to support it in its disputes with capital." The writer thinks this principle ought not to be allowed to become established without a challenge; and he suggests that an association of ratepayers in one of the Unions affected might be formed to bring forward a test-case to decide whether parochial authorities can support labour against capital in their disputes. Or the associated masters might do it."

The Gas Workers' Holiday Question at Belfast.—At the meeting of the Belfast Corporation on the 1st inst., the minutes presented by the Gas Committee recorded that, after receiving a report from the Engineer (Mr. J. Stelfox) on the question, the Committee had decided that they could not at present recognize the principle of granting holidays to the workmen in any department under their control. The adoption of the minutes having been moved by Mr. Young, Mr. Wilson advocated a week's holiday for the lamplighters; and Mr. Bowman proposed an amendment having for its object the granting of a week's holiday to lamplighters, stokers, and other employees having to work seven days a week. Mr. M'Donnell seconded the amendment. Mr. Young pointed out that if the amendment were adopted they might virtually abolish the Gas Committee; and he added that they would not hear the end of the matter until everyone of the employees had similar holidays. The amendment was, however, carried by 20 votes to 16. Commenting on this result, the "Belfast News Letter" says: "We cannot refrain from expressing the opinion that on the holiday question the majority of the Corporation are pursuing a wrong course. The Gas Committee consulted their Manager; and on his report they decided that they could not recognize the principle of granting holidays to the workmen in any department under their control. Yet the Corporation, in face of this strong expression, carried an amendment that a week's holiday should be given to lamplighters, stokers, and other employees having to work seven days a week. Sir Daniel Dixon resigned his membership of the Corporation and his chairmanship of the Gas Committee over this matter. The resignation is a matter of regret; but it is not to be wondered at. No man of business capacity would consent to hold the responsible position he did in such a huge business enterprise as the Gas Department, and be subject to the unthinking and irresponsible overruling of those who voted down the Gas Committee's recommendation on this question of holidays. Our City Corporation was remodelled a few months ago, and is, therefore, only yet in its apprenticeship. The fashion in which its Committee's reports are treated shows this. We hope time will effect an improvement; there is plenty of room for it."

Kenilworth Gas Company.—At the 45th annual meeting of this Company, the accounts were passed, and a dividend of 6 per cent., free of income-tax, was declared. After the re-election of Directors and an Auditor for the current year, a hearty vote of thanks was unanimously given to the Directors and the Manager (Mr. W. Sutton), and special thanks, with a small honorarium, were accorded to Mr. W. Cross for his gratuitous advice and assistance during the reconstruction of the plant and machinery in the past year.

The Blea Tarn Reservoir of the Lancaster Corporation.—The members of the Lancaster Corporation lately paid a semi-official visit to the site of the new Blea Tarn water reservoir, where work is well in hand. The area occupied by the reservoir when complete will be about 25 acres; and the water at the deepest part will be 54 feet deep. The major portion of the site is now covered by a soft peaty bog—so soft and slimy in some places that it is unsafe to walk across it. The difficulty at the outset was to find a solid foundation; and for this purpose a cylinder was sunk near what was expected to be the deepest part of the bog. The cylinder went down 30 feet before it struck the clay subsoil. Up to the present about 72,000 cubic yards of material have been excavated out of an estimated total of 200,000 cubic yards. The reservoir will be formed by a natural embankment on three sides, but on the south side it will be necessary to construct an embankment. In regard to this part of the work the Corporation may be said to have been extremely fortunate, for a solid clay foundation has been found at a depth of 18 feet. The bank, which in the widest part will be 10 feet wide, tapering down at each end to 7 feet, is from 16 to 18 feet deep, and will be a puddle core earth embankment, pitched on the inside. The capacity of the reservoir will be 120 million gallons; and the total cost is estimated at between £60,000 and £65,000. The task of filling in the clay puddle core of the embankment was inaugurated by the Mayor (Alderman Huntington) and the other visitors each emptying a barrowload of puddle down a high wooden funnel.

Messrs. Jonas Drake and Son have secured the contract for the supply to the Halifax Gas-Works of a set of condensers, complete with connecting pipes and valves, for the sum of £2666.

Messrs. Kirkham, Hulett, and Chandler, Limited, have secured orders for a patent "Standard" washer-scrubber and Marshall's patent condensers for erection at the Scarborough Gas-Works.

The Barrowfield Iron-Works Company, Limited, have secured the contract for the iron and steel work of the new lime-sheds and high-level railway, &c., at the Dawsholm Gas-Works, Glasgow; their tender being the lowest submitted.

The Warrington employees of the firm of Messrs. Richmond and Co., Limited, with their friends, to the number of about 700, had their annual excursion on the 2nd inst. Blackpool was the place selected; and the tickets distributed included admission to the Tower. The Managers, foremen, and office employees dined at the Palatine Hotel; Mr. E. W. T. Richmond presiding. A delightful day was spent.

References have been made from time to time in the "Journal" to the Herschel "Venturi" meter for the measurement of water in bulk. The appliance is suitable for mains of any dimensions, from 6 inches to 6 feet in diameter; and particulars as to its working will be found in an illustrated pamphlet just issued by Mr. G. Kent, High Holborn, W.C., the sole licensee and manufacturer, except for North America.

The Whessoe Foundry Company, Limited, have received from the Gas Committee of the Middlesbrough Corporation, through their Engineer (Mr. David Terrace), instructions to supply a Whessoe-Munich carburetter for enriching 100,000 cubic feet of gas 3-candle power per hour. Several orders for this apparatus are in hand; and it can be seen in operation at the Tynemouth Gas-Works, where Mr. Hardie has entirely dispensed with the use of cannel coal.

It will be seen by an announcement which appears in our advertisement columns that Mr. Alfred Richards has received instructions from the Directors of the Brentford Gas Company to submit to public auction at the Mart, Tokenhouse Yard, next Monday, £15,000 of the Company's new stock of 1831, which ranks for a standard dividend of 7 per cent., subject to the sliding-scale. The last dividend on similar stock was at the rate of 9 per cent. per annum.

Exhibitions of gas appliances have lately been held by the following firms: Messrs. W. Parkinson and Co., at Harborne (Birmingham), with cookery lectures by Miss Sanderson. Messrs. Richmond and Co., Limited, at Openshaw, Portobello, Alexandra Park, Eccles, and Misterton, with lectures by Mrs. Middleton, Miss Dennell, Miss Richmond, Miss Turner, and Miss Smallwood. Messrs. Charles Wilson and Sons at Goole, with lectures by Miss Holroyd. Messrs. John Wright and Co., Limited, at Oldham, with lectures by Miss Parker.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale than all other Oxides combined. Purity and uniformity of quality guaranteed.

JOHN WM. O'NEILL, Managing Director,
160, 161, & 162, Palmerston Buildings,
Old Broad Street,
London, E.C.

Andrew Stephenson, Agent. All communications re Oxide to the Company as above.

WINKELMANN'S "VOLCANIC" and "VOLCUM" CEMENT. Fire Resistance up to 4500° Fahr. In use in Gas-Works all over the World.

ANDREW STEPHENSON,
182, Palmerston Buildings,
Old Broad Street,
London, E.C.

Telegrams: "Volcanism, London."

J. & J. BRADDOCK, Globe Meter Works, Oldham.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Address: "Braddock Oldham."

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Limited, Chemical Works, Leeds, specially produce this ACID from SULPHUR, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.
Telegraphic Address: "Porter Lincoln."
[For Illustrated Advertisement, see July 5, p. 73.]

GAS PURIFICATION.

OXIDE OF IRON BOG ORE.

BALE & CO.'S Oxide of uniform quality. SPECIAL FIRE CEMENT, OXIDE PAINTS, OILS, SULPHURIC ACID, &c.
190 and 121, Newgate Street, London, E.C.
Telegrams: "Bogore, London."

BROTHERTON & CO.
Offices: Commercial Buildings, Leeds.
Correspondence invited.

HYDRATED OXIDE OF IRON.

PREPARED from pure Iron.
Two or three times as rich as Bog Ore.
Strong action on Sulphuretted Hydrogen.
To be used alone, but will increase activity of other Oxides.
Less than half the price of Bog Ore.
Can be lent on hire.
Write for tabulated results.
Read Holliday and Sons, Limited, Huddersfield.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of, PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAY.

SULPHATE OF AMMONIA SATURATORS.

JOSEPH TAYLOR & CO., Chemical Plumbers, &c., and Makers of every description of Solid Plate Lead and Timber Cased Saturators, &c., CENTRAL PLUMBING WORKS, TOWN HALL SQUARE, BOLTON. Special attention to Repairs.
Before placing Orders, please write for Estimate.
Telegraphic Address: "SATURATORS, BOLTON."

PATENTS FOR INVENTIONS.

J. C. CHAPMAN, M.I.M.E., and Fel. Chartered Inst. Patent Agents. ADVICE ON ALL MATTERS CONNECTED WITH ABOVE.
Information and Handbook on application.
70, CHANCERY LANE, LONDON, W.C.

NEW GAS PLANT CEMENT.

JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
MANCHESTER.
For all Joints in connection with Oil-Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
For all Ammonia Joints.

SULPHURIC ACID for Sale.
BROTHERTON AND CO., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

TO GAS AND WATER OFFICIALS.

SPECIALLY favourable terms for Cycles. First-Class Workmanship and Material guaranteed. Art Catalogue post free.
MELROSE CYCLE COMPANY, COVENTRY.

TUBES for Gas, Steam, and Water (all Sizes) Welded or Riveted. TANKS, HYDRAULIC MAINS, RETORT-LIDS, &c.
JOHN SPENCER, Globe Tube Works, WEDNESBURY; and 14, Great St. Thomas Apostle, LONDON.

HUTCHINSON BROTHERS, Gas Engineers, &c., Falcon Works, Barnsley, Makers of Wet and Dry Gas-Meters, Brass-Work, and general Gas Apparatus, Lead Saturators, Tanks, &c., Tools, and Gas-Works Sundries. (See p. 2, last week's issue.)
Telegrams: "HUTCHINSON BROS., BARNSLEY."

AMMONIACAL LIQUOR wanted.
BROTHERTON AND CO., Ammonia Distillers. Works: BIRMINGHAM, LEEDS and WAKEFIELD.

SADLER & CO., Ld., Middlesbrough; ULVERSTON (BARROW); PORTSMOUTH; CARLTON (N.E.R.); and STOCKTON. Tar and Petroleum Distillers. Benzol and Petroleum Spirit, 700 and other Gravities specially prepared for Carburetting. SOLAR OIL for Gas Making, Kerosene, &c.
Correspondence invited.
Telegraphic Address: "SADLER, MIDDLESBROUGH."

IMPORTANT.

OLD Retorts made equal to new by repairing them with CROWTHER'S PATENT STICKFAST FIRE CEMENT. Unequalled for Repairing Inclines. Can be used in Hot or Cold Retorts; and "A1." for Mouthpiece Joints. Satisfaction Guaranteed.
CROWTHER, Practical Retort Setter, Manor Street, HUDDERSFIELD.

WATER-GAS PLANT.

ENGINEERS contemplating the above are invited to communicate with the Advertiser, who is prepared to give every assistance in designing Plant of any capacity.
J. L. FEATHERSTONE, 80, Amesbury Avenue, STREATHAM HILL.

GAS TAR wanted.
BROTHERTON AND CO., Tar Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

ENRICH YOUR GAS
WITH
CHEAP BENZOL.

AT to-day's Price of Benzol, Illuminating POWER cost less than a HALFPENNY PER CANDLE.
Apply to SADLER AND CO., MIDDLESBROUGH.

CANNEL, COAL, ETC.

JOHN ROMANS & SON, EDINBURGH, Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.
Prices, &c., will be forwarded on application to No. 80, ST. ANDREW SQUARE, EDINBURGH, / NEWTON GRANGE, NEWBATTLE, DALKEITH, } SCOTLAND.

ECONOMY IN PURIFICATION.

INCREASE the efficiency of your PURIFIERS by adopting CRIPPS'S PATENT BYE-PASS VALVE in the lower Tiers of Sieves. Practical Experience proves their Economy. Engineers are repeating orders after thorough trial.
References and Particulars can be obtained from the Makers—
C. & W. WALKER, Midland Iron-Works, Donnington, near Newport, SALOP.

YOUNG Practical Chemist, with Diploma (Three Years' Experience in large Continental Gas and Tar Works), wants SITUATION IN LABORATORY. Thorough knowledge of French and English.
P.C. 9, Poste Restante, OSTEND.

WANTED, a Situation as Indexer and COLLECTOR for Automatic Meters. Good References and Security if wanted.
Address No. 3090, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Situation as General ASSISTANT by Manager's Son. Qualified practical Engineer. Good Gas Chemist. Also holds Certificate for Gas Manufacture. Excellent Testimonials and References if wanted.
Address No. 3089, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TRAVELLER, representing a Firm of Fire-Clay Retort and Brick Manufacturers, covering North and South Wales, Eastern Counties, Midlands, Shropshire, &c., during Six Months of the Year, will be pleased to hear from Firms desirous of being represented. Is open to extend ground covered.
Address No. 3093, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, good Retort Setters.
Apply to R. DEMPSTER AND SONS, LIMITED, Elland, YORKS.

WANTED, by a Gas Corporation in the Midlands, a first-class RENTAL CLERK. Good encouragement to a first-class Man.
Apply, by letter, with References only, in first instance, to No. 3091, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, at medium-sized Gas-Works a GENERAL FOREMAN (trained Mechanic), used o Gas-Works Plant and Machinery. Age about 30.
Apply, by letter, for further Particulars, sending References, to No. 3094, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

A WORKING Foreman for Gas-Works wanted at the Darenth Asylum, near Dartford, Kent, under the Metropolitan Asylums Board. Candidates must thoroughly understand the Manufacture of Gas and Sulphate of Ammonia, and be capable of taking charge of Boilers and Exhausters, and of doing General Repairs. Wages 35s. a week, rising to 40s., with House and Garden, Coal, and Gas (subject to statutory deduction under the Poor Law Officers' Superannuation Act, 1896).
Apply to the STEWARD, at the Asylum, by letter, with *copies* of Testimonials.
July 7, 1898.

WANTED, a steady reliable and ex- perienced GASMAN for the Shifnal (Salop) Gas-Works. Must thoroughly understand the Manufacture of Coal Gas; also Main and Service Laying and House Gas-Fitting. Wages 28s. per week. Good House, Garden, Coal, and Gas. Successful Candidate will be required to enter upon his duties on the 30th inst.
Apply, in own handwriting, stating Age, Married or Single, with two *copies* of recent Testimonials as to capability, sobriety, and honesty not later than Tuesday, the 19th day of July inst., to
FARMER AND FARMER,
Secretaries.
Gas Offices, Victoria Road,
Shifnal, July 9, 1898.

CAMBRIDGE UNIVERSITY AND TOWN GASLIGHT COMPANY.

WANTED, for the above Company's Works, a competent GENERAL FOREMAN who must be thoroughly conversant with Regenerative Furnaces and the modern methods of Carbonizing and Purifying.
He must also be competent to take entire charge of the Works in the absence of the Manager; and a mechanical knowledge would be an advantage.
Wages to commence at £2 5s. per Week, with good House, Coal, Gas, and Rates free.
Apply, by letter only, in Candidate's own handwriting, with *copies* of Testimonials, to
R. BROWN,
Engineer and Manager.
Gas Offices, Sidney Street,
Cambridge, July 8, 1898.

SPENT OXIDE wanted.
BROTHERTON AND CO., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

WANTED, Carbon in 4 Ton Lots, or more; also OIL CARBON.
State Price, f.o.r. at nearest Station, to No. 3031, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GWYNNE & BEALE'S
PATENT
GAS-EXHAUSTERS AND STEAM-ENGINES
FOR FULL PARTICULARS, APPLY TO THE MAKERS:
GWYNNE & CO.,
Telegrams:
"GWYNNEGRAM, LONDON."
HYDRAULIC AND GAS ENGINEERS
Telephone
No. 95 Holborn.
(Late Essex Street Works, Victoria Embankment, London),
BROOKE STREET WORKS, HOLBORN, LONDON, E.C.

GAS CARBON Wanted, not less than 4-Ton Loads.
Apply to the BRIMINGTON CARBON COMPANY, Sowerby Bridge, YORKS.

A GAS Company require a second-hand 10-inch GOVERNOR.
Send Particulars, to No. 3093, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE—One small Gas Exhauster, combined with Steam-Engine, and one without Engine. Both perfectly new, and of the very best Design and Workmanship.
SELLERS PICKERING AND Co., Gas Engineers, Ravensthorpe, YORKS.

FOR SALE—A Second-hand (thoroughly overhauled) Vertical PUMP EXHAUSTER, with Steam-Engine (with clean Water and Liquor Pumps attached), to pass 7000 cubic feet of Gas per hour.
Apply to R. DEMPSTER AND SONS, LIMITED, Elland, YORKS.

FOR SALE—One (nearly new) Waller's Patent Three-Blade Beale improved GAS EXHAUSTER, 12 in. diam. by 12 in. long, with tight and loose Pulleys, capable of exhausting 5000 cubic feet per hour.
For Price, &c., apply to G. S. DE RITTER, 33, Three Colt Street, LIMEHOUSE, E.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. **Compare Prices and Particulars before ordering elsewhere.**
J. F. BLAKELEY, Gas Engineer, Ravensthorpe, YORKS.

FOR SALE, Cheap—The under- mentioned GAS PLANT:—
2 PURIFIERS, 8 ft. square by 4 ft. deep, complete.
2 PURIFIERS, 5 ft. square by 4 ft. deep.
1 PURIFIER, 5 ft. square by 2 ft. 9 in. deep.
CONDENSER, 4 inches diameter, Vertical Pipes.
EXHAUSTER (Gwynne's), 20,000 c. f. per hour.
Apply to SAML. WHILE AND SONS, 60, QUEEN VICTORIA STREET, E.C.

LITTLEHAMPTON GAS COMPANY, LIMITED.

THE Directors of the above Company are desirous to receive TENDERS for the supply of about 1500 Tons of DURHAM or other similar GAS COAL, to be delivered, as required, during the Twelve Months ending Oct. 1. 1898.
Price to be f.o.b. at Tyne or other Port; and Tenders to be sealed and addressed to Charles Bartlett, Esq., Chairman, Bankside, Arundel, Sussex.
Further Information may be obtained of the undersigned.

A. W. ELTON,
Engineer and Manager.

LEYLAND AND FARINGTON GAS COMPANY, LEYLAND, NEAR PRESTON.

TAR AND AMMONIACAL LIQUOR.

THE Directors of the Leyland and Farington Gas Company are prepared to receive TENDERS for the surplus TAR and LIQUOR produced at their Works during the next Twelve Months. Quantity made, about 150 Tons Tar and 400 Tons Liquor. Delivered free on Rails in Contractors' Tanks.
Tenders, endorsed "Tar and Liquor," to be in by Monday, the 25th of July.

CHARLES ELLIOTT,
Secretary.

Leyland, Lancs.,
July 7, 1898.

LEYLAND AND FARINGTON GAS COMPANY, LEYLAND, NEAR PRESTON.

GAS COAL.

THE Directors of the Leyland and Farington Gas Company are prepared to receive TENDERS for their supply of COAL for the next Twelve Months. Quantity used, about 2000 Tons Coal, and 500 Tons Cannel.
Tenders, endorsed "Gas Coal," to be in by Monday, the 25th of July.
No special Form of Tender supplied.

CHARLES ELLIOTT,
Secretary.

Leyland, Lancs.,
July 7, 1898.

BOROUGH OF ROTHERHAM.
(GAS DEPARTMENT.)

TO BUILDERS.

THE Gas Committee of the above Cor- poration are prepared to receive TENDERS for the CONVERSION of an existing Gasholder Tank into a TAR and LIQUOR STORAGE WELL, and also for the putting in of FOUNDATIONS for New Purifiers.
Plans and Specifications may be seen upon application to Mr. F. A. Winstanley, Engineer, Gas Offices, Rotherham.
The Contractor must not pay less than the Standard Rate of Wages paid in the district, and must observe the proper conditions of labour, and no sub-contracting will be allowed, except by permission of the Corporation.
Tenders to be delivered to me on or before the 20th inst., endorsed "Liquor Tank."

By order,
H. H. HICKMOTT,
Town Clerk.

Council Hall, Rotherham,
July 1, 1898.

CITY OF LEEDS.
(GAS DEPARTMENT.)

THE Gas Committee of the Leeds Cor- poration are prepared to receive TENDERS for the supply of a STATION METER, to pass 100,000 cubic feet of Gas per hour, for the New Wortley Gas-Works.
Endorsed Tenders, accompanied by Specification and detailed Drawings, and addressed to the Chairman of the Gas Committee, Municipal Buildings, Leeds, will be received not later than Monday, the 18th inst.
The Committee do not bind themselves to accept the lowest or any Tender.

R. H. TOWNSLEY,
General Manager.

Municipal Buildings, Leeds,
July 7, 1898.

GAS COAL.

THE Bethesda Urban District Council are prepared to receive TENDERS for the supply of GAS COAL required at their Gas-Works for One Year from the 1st of August, 1898, in such quantities and at such times as may be required (in all about 270 Tons), delivered at Bethesda Station.
The person whose Tender is accepted will be required to enter into an Agreement with the Council for the due performance of his contract.
The lowest or any Tender not necessarily accepted.
Tenders to be sent to me on or before the 19th of July, 1898.

R. BENJAMIN EVANS,
Clerk.

Bron Arfon, Llanllechid,
Near Bangor, July 6, 1893.

BOROUGH OF HEYWOOD.

THE Gas Committee invite Tenders for the supply of LIME, TUBES and FITTINGS and SULPHURIC ACID.
Specification and Form of Tender may be obtained from Mr. W. Whatmough, Gas Manager.
Contractors tendering for this work must pay their workpeople at least the Standard or Trade Union Rate of Wages, and observe the trade conditions which attach to the various kinds of work for which the Tender is sent in.
Sealed and endorsed Tenders to be sent to me not later than Tuesday, July 19, 1898.

By order,
J. H. BALDWICK,
Town Clerk.

Municipal Buildings, Heywood,
July 1, 1893.

BOROUGH OF DARLINGTON.

TO COLLIERY PROPRIETORS.

THE Gas-Works Committee of the Darlington Corporation invite TENDERS for the supply of 26,000 Tons, or thereabouts, of screened GAS COAL, delivered as required, at their Gas-Works Siding, commencing on or about the 1st of October next.
The Coal proposed to be supplied must be of the best description for Gas Making, free from all Impurities, and to the satisfaction of the Gas-Works Engineer.
The Committee reserve the right of accepting a Tender for the whole or any portion of the quantity of Coal tendered for.
Tenders, endorsed "Tender for Gas Coal," and addressed to the Chairman of the Gas-Works Committee, Town Hall, Darlington, must be sent in not later than the 21st inst.
No pledge is given that the lowest or any Tender will be accepted.

HY. G. STEAVENSON,
Town Clerk.

Darlington, July 8, 1898.

TENDERS FOR COAL.

THE Directors of the Isle of Thanet Gas- light and Coke Company invite TENDERS for the supply of the best NEWCASTLE GAS COAL, to be delivered into the Company's Works at Margate in specified Monthly Quantities for One, Two, or Three Years (the Second and Third Years at the option of the Directors). Delivery to commence Oct. 1, 1898.
The approximate yearly requirements will be: First Year, 20,000 Tons; Second Year, 21,000 Tons; Third Year, 23,000 Tons.
Sealed Tenders, endorsed "Coal," on forms to be obtained from the undersigned, to be sent in on or before Thursday, the 21st of July, addressed to the Chairman of the Company.
The Manager, Mr. J. Dougall, will furnish any further Particulars that may be required.
The Directors do not bind themselves to accept the lowest or any Tender.

THOMAS C. FULLER,
Secretary.

Gas-Works, Margate,
July 8, 1898.

TENDERS FOR GAS COAL.

THE Directors of the Sunderland Gas Company are prepared to receive TENDERS for GAS COAL for One, Two, or Three Years (in lots of 5000 Tons and upwards), to be delivered by Rail on the Company's Sidings at Hendon or Ayre's Quay Gas-Works, from Aug. 1, 1898, in such Monthly proportions, during the continuance of the Contract, as the make of Gas may render necessary.
The Coal to be Clean, Dry, and Fresh Worked.
Tenders, endorsed "Tender for Gas Coal," specifying the description of Coal, the name of the Pit, and the particular Seam from which the Coal is to be supplied, to be left at the Offices of the Company, Borough Road, Sunderland, on or before Ten a.m., on Tuesday, July 19.
Short weight or inferior quality to be allowed for.
The Company do not bind themselves to accept the lowest or any Tender until after a satisfactory trial of the Coal to which such Tender may relate shall have been made.

J. H. COX,
Secretary and Manager.

Sunderland, July 7, 1898.

SURPLUS TAR.

THE Gas Committee of the Corporation of Coventry are prepared to receive TENDERS for the purchase of the surplus TAR produced at their Works, Coventry, for One Year from Aug. 1, 1898.
Make about 2000 Tons per annum.
Tenders, stating price per ton delivered into Boat, to be sent to the Manager, marked "Tender for Tar," not later than July 16.
The Committee do not bind themselves to accept the highest or any Tender.

GEO. WINSTANLEY, Assoc.M.Inst.C.E.,
Manager.

Gas-Works, Coventry,
July 6, 1898.

OSWALDTWISTLE URBAN DISTRICT COUNCIL.

THE Gas Committee invite Tenders for the TAR and LIQUOR produced at their Works for One Year from the 31st day of July, 1898.
The quantity of Coal carbonized is about 3700 Tons.
Further Particulars may be obtained from the Manager, Gas-Works, Church, near Accrington.
Tenders, endorsed "Tender for Tar," to be addressed to me, and to be delivered not later than Wednesday the 27th of July.

WM. SANDEMAN,
Clerk.

District Council Offices,
Oswaldtwistle, July 6, 1898.

CORPORATION OF MOSSLEY.

THE Gas Committee of the above Cor- poration are prepared to receive TENDERS for the supply of MATERIALS and LABOUR necessary in RE-SETTING FOUR THROUGH BENCHES OF RETORTS on the Direct-Firing Principle.
The Plans may be viewed, and Specifications obtained, on application to the Engineer at the Gas-Works, Roaches, Mossley.
Sealed Tenders, endorsed "Retort Setting," must be in the hands of the Town Clerk, Mossley, on or before noon of Monday, the 18th of July next.

F. W. JOHNSTON,
Engineer and Manager.

Gas-Works, Mossley,
July 6, 1898.

BOROUGH OF WARRINGTON.
(GAS DEPARTMENT.)

COAL AND CANNEL.

TENDERS are invited for the supply of 3000 Tons of CANNEL, and 25,000 Tons of COAL (Screened or Through-and-Through) and SLACK.
Sealed Tenders, endorsed, addressed to the Chairman of the Gas Committee, Gas Offices, Warrington, must be sent in not later than the 21st inst.
Further Particulars can be obtained on application to Mr. W. S. Haddock, Engineer to the Works.

FREDK. TAYLOR,
Secretary.

Gas Offices, Warrington,
July 1, 1898.

TO IRONFOUNDERS, IRONMONGERS, AND OTHERS.

THE Downham Market Urban District Council invite TENDERS for the supply of LAMP-POSTS and LAMP-BRACKETS, with Lamps complete. About 70 Lamp-Posts and 15 Brackets may be required.
Tenders to state the Price at per Post and Lamp and at per Bracket and Lamp, and furnish Dimensions and Designs.
Tenders to be sent to me on or before the 18th of July, 1898.
The Council do not bind themselves to accept the lowest or any Tender.

HARRY WAYMAN,
Clerk to the Urban District Council.

Downham Market.

TENDERS FOR TAR.

THE Gas Committee of the Carnarvon Corporation invite TENDERS for the purchase of the surplus TAR made at their Works during the Twelve Months ending the 31st of August, 1899.
The Tar will be loaded free into Contractor's Tank Trucks on Rail at the Gas-Works Siding, Carnarvon.
Payments: Net Cash Monthly.
Sealed Tenders, endorsed "Tender for Tar," and addressed to the Chairman of the Gas Committee, Guildhall, Carnarvon, to be delivered on or before Friday, the 22nd inst.
The Committee do not bind themselves to accept the lowest or any Tender.
Any further Information may be had from the undersigned.

WILLIAM M. RUXTON,
Manager.

Gas Office, Carnarvon,
July 9, 1898.

TIPTON GAS-WORKS.

COAL CONTRACTS.

THE Gas Committee of the Tipton Urban District Council are prepared to receive TENDERS for the supply of GAS COAL for a period of One, Two, or Three Years, to be delivered carriage free to the Gas-Works Siding (L. & N.W. Railway).
Specifications and Form of Tender may be obtained at the Gas-Works on application to Mr. Vincent Hughes, the Engineer and Manager.
Sealed and endorsed Tenders to be sent to me the undersigned not later than Ten a.m., on Monday, the 18th inst.
The Committee do not bind themselves to accept the lowest or any Tender.

By order,
JNO. W. WARING,
Clerk to the Council.

Public Offices, Tipton,
July 5, 1898.

TO COLLIERY PROPRIETORS.

THE Directors of the Sheffield United Gaslight Company invite TENDERS for GAS COAL, NUTS, and CANNEL for delivery during Twelve Months to the 30th of June, 1899.

The Quantities required will be approximately—

Gas Coal and Nuts . . . 185,000 Tons.
Cannel . . . . . 20,000 „

Tenders (forms for which can be obtained on application) must be delivered to the undersigned by post not later than the first post on Saturday, July 16.

The Directors do not bind themselves to accept the lowest or any Tender.

HANBURY THOMAS,
General Manager and Secretary.

Commercial Street, Sheffield,
June 25, 1898.

SOUTH SHIELDS GAS COMPANY.

TO METER MANUFACTURERS.

THE Directors of the South Shields Gas Company invite TENDERS for the supply of DRY GAS-METERS required during the Year ending the 30th of June, 1899.

The Meters must be of best quality, stamped, and delivered at the Gas-Works, carriage paid.

The Directors do not bind themselves to accept the lowest or any Tender.

Form of Contract and further Particulars may be had on application.

Sealed Tenders, marked "Tenders for Meters," to be delivered to the undersigned not later than Thursday, the 14th of July next.

J. H. PENNEY,
Secretary.

Gas Offices, Chapter Row, South Shields,
July 4, 1898.

LEIGH URBAN DISTRICT COUNCIL.

(GAS DEPARTMENT.)

THE Gas Committee of the above Council invite TENDERS for the supply of 10,000 Tons of GAS COAL and 1000 Tons of CANNEL, for the Year ending the 31st of July, 1899.

Forms of Tender may be obtained on application to the Manager at the Gas-Works.

Sealed Tenders, addressed to me, and endorsed "Tender for Gas Coal" or "Cannel" (as the case may be), to be delivered at my Office by Twelve o'clock noon on Monday, July 18 next.

The Council do not bind themselves to accept the lowest or any Tender, and may accept any Tender for a part only of the specified quantity.

By order,
PEREGRINE THOMAS,
Clerk to the Council.

Town Hall, Leigh, Lancs.,
June 30, 1898.

TO CAPITALISTS AND OTHERS.

SWANSEA, GLAMORGANSHIRE.

MESSRS. JOHN M. LEEDER & SON have received instructions from the Directors of the Swansea Gaslight Company to offer FOR SALE by Public Auction, at the Royal Hotel, High Street, Swansea, on Friday, the 22nd day of July, 1898, at 2.30 for 3 o'clock precisely in the Afternoon

£20,000 NEW ORDINARY STOCK, 1898,

in the Swansea Gaslight Company, in 250 Lots of £100 and £50 each respectively; being part of the Additional Capital of the Company authorized to be raised by the Swansea Gas Act, 1898, and pursuant to the Provisions and Conditions therein contained.

The Consolidated Stock 1898 and the New Ordinary Stock 1898 are entitled to receive Dividends at the rate of £5 in respect of every £100 of such Capital authorized by the Act; and such Stocks rank equally with each other in all respects.

Purchasers of this Stock will be entitled to receive Dividends as from the 1st day of July inst.

Particulars and Conditions of Sale containing all necessary Information may be obtained on application to the AUCTIONEERS, at their Offices, Goat Street Chambers, SWANSEA, or of THORNTON ANDREWS, Esq., Secretary and Manager to the Swansea Gaslight Company, Oystermouth Road, SWANSEA.

SOUTHWARK & VAUXHALL WATER COMPANY.

SALE BY TENDER OF £100,000 THREE PER CENT. DEBENTURE STOCK.

NOTICE is Hereby Given, that it is the intention of the Directors of the Southwark and Vauxhall Water Company to SELL BY TENDER, to be received at the Company's Office, Southwark Bridge Road, S.E., not later than Twelve o'clock noon on Tuesday, the 26th day of July, 1898, £100,000 DEBENTURE STOCK of the Company.

The Stock now for sale is the third portion of the Capital authorized by, and to be issued under, the Provisions of the Southwark and Vauxhall Water Act, 1894, and will be entitled, from the 30th day of September, 1898, to Interest at the rate of 3 per cent. per annum. It will be known as Debenture Stock "B," and may be redeemed at par at any time after the expiration of 25 Years from the date of issue, subject to Six Months' previous Notice of the intention to redeem. Debenture Stock "B" will rank for Interest and otherwise *pari passu* with the other Debenture Stock of the Company, but before the Ordinary and Preference Stock and Share Capital. It is a lawful investment for Trustees.

For Particulars, Forms, and Conditions of Tender, apply at the Office of the Company, Southwark Bridge Road, S.E.

By order of the Board of Directors,
MONTAGUE WATTS,
Secretary.

Southwark Bridge Road, S.E.,
July 12, 1898.

NEWCASTLE AND GATESHEAD WATER COMPANY.

TO BE SOLD BY AUCTION, in the Board-Room of the Company's Offices, Pilgrim Street, Newcastle-on-Tyne, on Tuesday, July 19, 1898, at Half-past Twelve o'clock precisely, by Mr. CHARLES A. JOEL, in such Lots as are provided for in the said Company's Act of 1894—

FORTY THOUSAND POUNDS OF FIVE PER CENT. PREFERENCE STOCK (1894).

Printed Particulars and Conditions of Sale may be had at the Company's Offices; of Messrs. George Armstrong and Sons, Solicitors, Newcastle-on-Tyne; or of the Auctioneer, 89, Pilgrim Street, Newcastle-on-Tyne.

GEORGE SMITH,
Secretary.

Newcastle-on-Tyne,
June 27, 1898.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held MONTHLY, at the Mart, Tokenhouse Yard, E.C.

He also undertakes the issuing by Auction of Gas and Water Stocks and Shares under Parliamentary Powers.

Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. Alfred Richards's Offices, 18, FINSBURY CIRCUS, E.C.

By order of the Directors.

BRENTFORD GAS COMPANY.

£15,000 OF NEW STOCK 1881.

Ranking for a Standard Dividend of 7 per cent. per annum subject to the Sliding-Scale; the last Dividend on similar Stock having been at the rate of 9 per cent.

MR. ALFRED RICHARDS will Sell the above BY AUCTION, at the Mart, Tokenhouse Yard, E.C., on Monday, July 18, at Two o'clock precisely, in Lots.

Particulars may be obtained of the SECRETARY of the Company, at the Offices, BRENTFORD; and of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Executors of the late G. E. Wood, Esq.

IMPORTANT SALE OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS will Sell BY AUCTION, at the Mart, E.C., on Monday, July 25, 1898, at Two for half-past Two o'clock, in Lots, STOCKS AND SHARES as follows:—

WALTON-ON-THAMES AND WEYBRIDGE GAS COMPANY.—£1480 DEBENTURE STOCK and 200 £10 "A" and "B" SHARES.

HAMPTON COURT GAS COMPANY.—£1000 DEBENTURE STOCK and 140 £10 "A" and "B" SHARES.

PETERSFIELD GAS COMPANY, LIMITED.—100 £5 SHARES.

KINGSTON-ON-THAMES GAS COMPANY.—£100 DEBENTURE STOCK and three £50 SHARES.

WEST SURREY WATER COMPANY.—36 £10 SHARES.

SUNBURY GAS CONSUMERS' COMPANY.—68 £5 SHARES.

WOKING DISTRICT GAS COMPANY.—50 £5 SHARES.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

AUTOMATIC METER REGISTER

The Meter Life Book specially adapted, and revised for "Slot" Meter Registration by

ROBERT P. KEYS.

In sizes to record 1000 Meters, with

Index, Half Bound	£2	2	0
To record 500 Meters	£1	15	0
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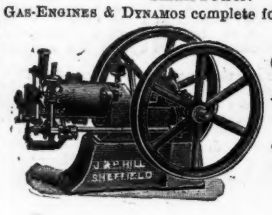
GAS-ENGINES & DYNAMOS complete for HOTEL, HOUSE, and SHOP Installations.



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Comprising Tables, Notes, and Memoranda relating to the Manufacture, Distribution, and Use of Coal Gas, and the Construction of Gas-Works.

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HEBBURN MAIN GAS COALS.

Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·4 candles.
Coke . . . . . 68 per cent.

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Present Daily Produce over 5000 Tons.

Latest Analysis—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation

Yield of Gas per Ton . . . 11,205 Cubic Feet.
Illuminating Power 16 7/10 Stand. Sperm. Candl.
Coke (of good & pure quality) 13¾ Cwt. per Ton.
Sulphur . . . . . A little over 1 per Cent.
Ash . . . . . Under 1 per Cent.
Tar . . . . . 163 lbs. (Avoir.) per Ton.
Ammoniacal Liquor 103 lbs. (Avoir.) per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

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FOR PRICES AND PARTICULARS, APPLY TO

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BOLDON GAS COALS.

ANALYSIS.

Yield of Gas per ton . .	10,500	Cubic Feet.
Illuminating Power . .	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

For Prices, &c., apply to

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Analysis made by

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Yield of Gas per Ton . .	10,500 Cub. Ft.
Illuminating Power . .	16·9 Candles.
Coke (of good quality) . .	67·5 per Cent.
Sulphur	0·58 „
Ash	2·73 „

For Price, &c., apply to the

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FOR

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For use in the

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Illuminating Power	38·22 candles.
Coke per ton	1,301·33 lbs.

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Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	17·8 candles.
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Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	73·1 per cent.

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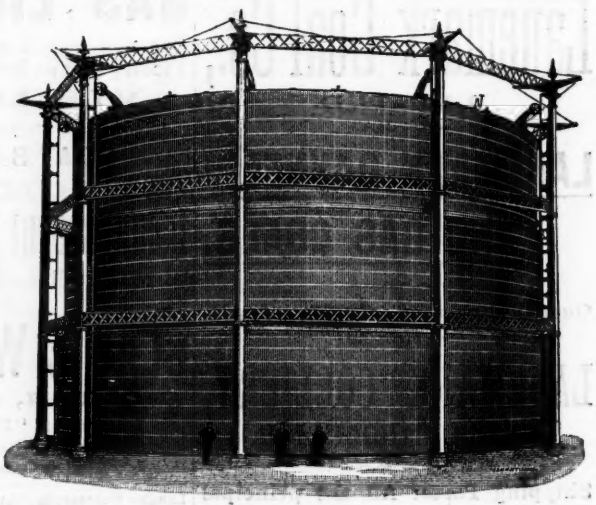

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Supply to any Railway Station, or for Export, all kinds of Fuel for Gas purposes.

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[See Illustrated Advertisement, June 28, p. 1604.]

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SUPPLY FROM STOCK

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AND ALL KINDS OF GAS-WORKS APPARATUS.

SOCKET-PIPES FOR GAS OR WATER PURPOSES.

FLANGE PIPES FOR STEAM.

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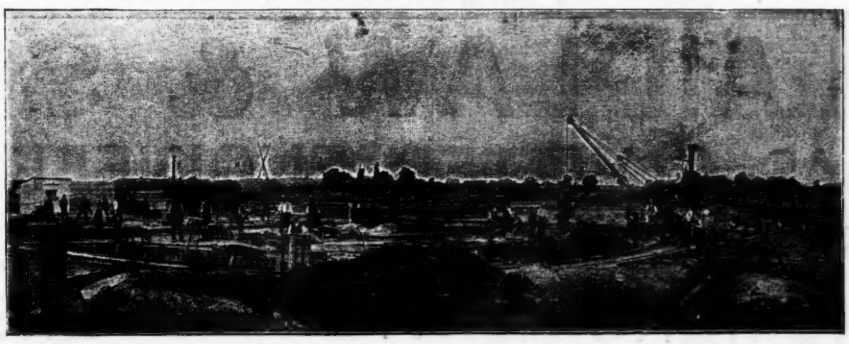

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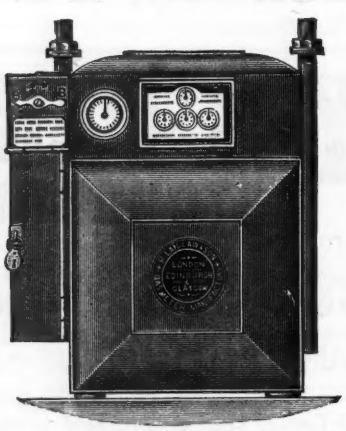

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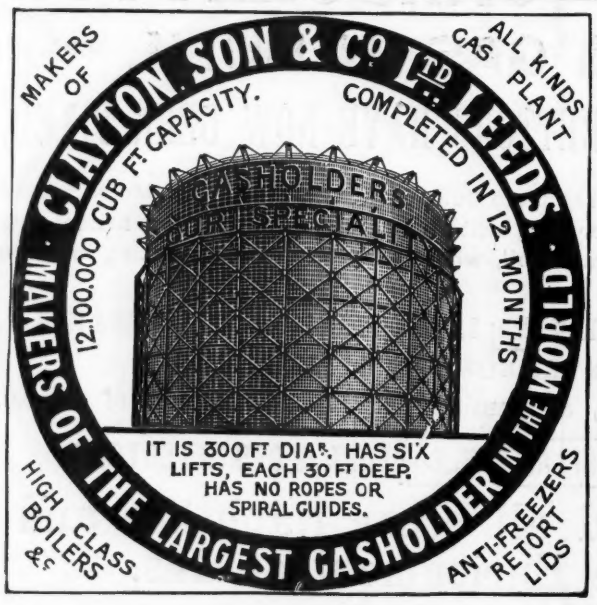
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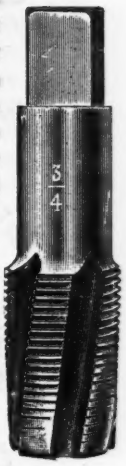

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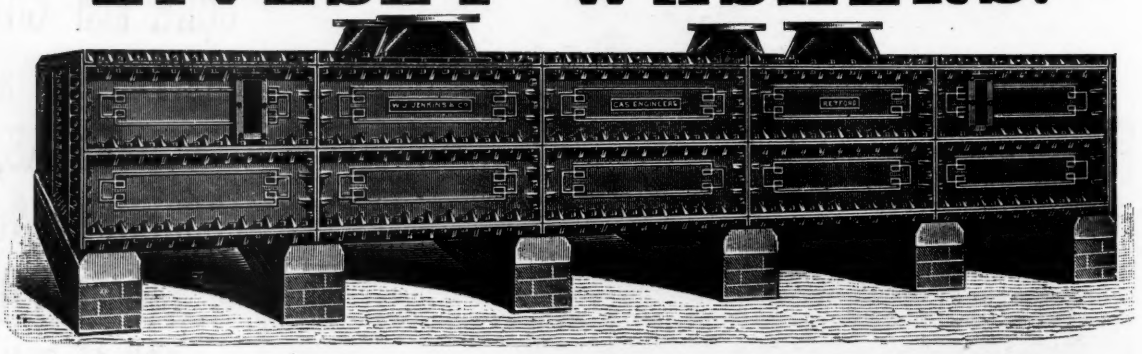

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